UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
* * *
PUBLIC MEETING ON PACKAGE PERFORMANCE
STUDY AND NUREG/CR-6672

Tropicana Hotel
3801 Las Vegas Blvd.
Hawaiian Rooms I and II
Las Vegas, Nevada
Tuesday, August 15, 2000

The above entitled meeting commenced, pursuant to notice, at 9:35 a.m.

P R O C E E D I N G S

[9:35 a.m.]

MR. CAMERON: This is Chip Cameron. I'm the Special Counsel for Public Liaison at the Nuclear Regulatory Commission, and it's my pleasure to serve as your facilitator for today's roundtable discussion.

I'd like to welcome all of you to the meeting on spent fuel transportation and thank you all for being here.

In a few moments, Dr. Susan Shankman, from the Nuclear Regulatory Commission, is going to formally welcome you and give you a short overview of NRC's responsibility in this area. But I'd like to cover three things with you, first, before we get into the substance of today's program. One are the objectives for the meeting; secondly, the format and ground rules for the meeting; and, thirdly, I'd just like to briefly go over the agenda with you. And then after that, before we ask Dr. Shankman to talk to us, I'd like to go around the table and have everybody introduce themselves to each other.

In terms of objectives, there are three objectives. One is to provide you with information on the NRC's spent fuel transportation study, known as NUREG-6672; in addition to that, to provide you information on a report, a draft report or a report with draft recommendations or proposed recommendations in it, that Sandia National Lab has

done for the NRC on further studies on the performance of spent fuel packages.

We want to give you information on that, but secondly, most importantly, we want to get information from you, to hear your comments and suggestions on NUREG-6672, on transportation risk; also, on the draft Sandia report on spent fuel package performance.

There is another piece to this, which is in the package that everybody should have, and that's a brochure that the NRC was going to issue at some point on spent fuel transportation, and, there, we're trying to make sure that the report would be understandable and clear to the public and, of course, factually correct.

So we want to get some input from you on that. And on all of these different issues, we're not just interested in your individual comments, but also on the collective views of the participants around the table.

And one of the purposes of doing a roundtable discussion today is for all of you to have an opportunity to discuss your views with the other participants around the table.

And, ultimately, in terms of an ultimate objective, the discussion is meant to inform the NRC's decision-making on these issues, particularly the Sandia package performance report.

In terms of format and ground rules, we are going to focus on the people around the table for discussion, but I will be going out after each major discussion area to the audience to see if anybody out there has a comment or a question on the discussion that you've heard today.

Each of you at the roundtable has a name tent in front of them and if you do want to talk, could you just turn it up like this? And hopefully it won't blow over. But that will at least allow me to keep track of who wants to talk and it will save you the effort of having to keep your hand up.

Our stenographer will -- and that's Carey, Carey Leffler over there is our stenographer, and he will be able to keep track of who is talking at the table, but at least at the beginning, if you could just say your name when you're going to talk.

I may not take all of the cards in the sequence they're raised, so that we can try to follow what I call a discussion thread on a particular subject, to see if we can find out what others think of someone's views that had been expressed on a particular area.

When we go out to the audience, if you could just signal me and I will either bring you this talking stick out for your question or comment or you're free to come up here to the microphone, and please state your name and your

affiliation, if appropriate.

And if you do talk from the audience, if you do have a business card, if you could give it to Carey, we can make sure we get the correct spelling of your name on there.

I would just ask all of you to try to be relatively concise, and I'm putting the relatively in there, but we do have a lot of issues to discuss and I'm sure a lot of comment.

And I would note that even though we don't have an expansive time for discussion, that I think that today's session will be useful to you in an educational sense, as well as being able to give us your comments and to have discussion.

There are written comments being accepted on not only the Sandia report, but also on anything you'd like to say about NUREG-6672, and that comment period is open until September 29. So you may want to use what you hear today as a vehicle for preparing your written comments, but just let me note that anything that is said today around the table or from the audience will be considered by the NRC as much as the written comments would be.

And I would ask that only one person speak at a time, so that we can get a clear transcript and, also, more importantly, so that we can give our attention to whoever has the floor at the moment.

In terms of the agenda, I just wanted to perhaps give you a little bit more detail on that. We're going to start next with Dr. Shankman and then we're going to go to our first major discussion segment, which is the reexamination of spent fuel shipment risk estimates. This is the NUREG-6672.

We're going to have John Cook, from the NRC, sitting right up here and I'll introduce John in a moment, to give us an overview of why the NRC did the report.

Then we're going to go to Ken Sorenson, from Sandia National Labs, to give us an overview on the report. Then we'll have discussion up here on it, and perhaps start off with some clarifying questions to make sure that everybody understands what the process was and what the presentations were about.

We will then end the morning session, after the roundtable discussion, by going out to those of you in the audience for any comments that you have; break for lunch. And when we come back, we want to spend a half-hour specifically on the brochure that is in your materials. And, again, the brochure is meant to try to give the public a clear understanding about spent fuel transportation risk.

So we're not only interested in the information that's in there, but how the information is presented. And, again, John Cook will tell us a little bit about that, but

Bob Luna, right over here, from Sandia -- Bob Luna, who is not from Sandia, and we'll find out where he really is from, I guess, later on when I introduce him, but he'll also be helping us with that particular discussion.

From there we're going to move into the package performance study that was done by Sandia. And as a lot of you know, we had some sessions last year on what issues Sandia should look at.

They have looked at your comments. They have come back with some recommendations. We want to get your feedback on how well did they consider your comments and what do you think about the recommendations in the report.

And Rob Lewis, from the NRC staff, who is right out here, who will be at the table with us this afternoon, from the NRC, will give us an overview of that, and then we're going to go to Ken Sorenson again for a description of the Sandia report.

We'll go again to the audience after the roundtable discussion on those particular issues.

And we thought that what we would do at the end of the day, what's scheduled for 3:45 and we'll see how closely we meet that, but to have NRC and Sandia people throughout the room to have sort of many breakout sessions to talk to people not only from the roundtable, but from the audience, about the brochure in terms of clarity and understandability

of the particular brochure, or as well as any other subjects that people might want to bring up.

Does anybody have any questions on the agenda or ground rules at this point, before we go to introductions? Yes, Bob?

MR. HALSTEAD: Yes, Chip. I think it would be useful if you can really separate the discussion of 6672 and the scoping paper, at least from the standpoint of the State of Nevada. We have a number of extremely negative comments to report to you on NUREG-6672. On the other hand, we feel that the process that's been adopted for scoping for the modal study update is a very positive experience for us so far.

I would like to address these two issues separately.

MR. CAMERON: Okay. Let me say a few words about that. That's an extremely important point. The topics, 6672 and package performance, the package performance study, are, first of all, separated on the agenda, 6672 in the morning, package performance in the afternoon.

But as all of you know, a key component of 6672 are package performance issues.

I was going to suggest that when we discuss 6672, that the issues that are package performance issues, that maybe we could save those, put those in the afternoon

session and talk about the other aspects of 6672 that might not be directly related to package performance.

Of course, there are going to be implications back for 6672 from the package performance study, so there may need to be a revisitation of that. But I would like to follow through on your suggestion, Bob, by holding those package performance study issues until this afternoon.

Now, is that going towards your comment or do you have another suggestion?

MR. HALSTEAD: No. I think that complicates the matter, but I want to say one thing short, and then I'll wait and hear what Susan and John and other people have to say.

It's very important for the representatives of the Commission to clarify, for those of us affected by this study and by the modal study update, it's very important for the NRC representatives to explain how the Commission views NUREG-6672.

In particular, we are very concerned that parties preparing environmental impact statements or parties preparing licensing applications for transportation hardware may be tempted to use NUREG-6672 in NEPA proceedings, and we're extremely concerned about that.

And, secondly, I think it will make for a much more acrimonious discussion if you insist on discussing

these two very different documents, they are philosophically very different, in the same piece of discussion, but I will be happy to make it as acrimonious as you desire.

MR. CAMERON: You left me speechless, sort of, with that one, Bob. But I think that one thing that we want to do is to clarify at the front, after we hear from John Cook and from Ken Sorenson on the study, is the first issue that we might want to address is what I call the process issue, which is how will the Commission use 6672 in its regulatory program, and we'll be prepared to discuss that.

There may be -- I'm thinking about how to structure this agenda or this discussion. There may be clarifying questions from people around the table about 6672.

Why don't we start there, when we get there, and see how that goes? I'm not sure that we want to avoid any acrimonious discussion, if it's something that should be on the record and perhaps there may be other views on that.

But I don't think that it -- I just want to underscore what Bob said about -- I don't think that we want to have that interfere with our discussion of the Sandia report and recommendations on package performance.

I think that we can keep that separate and I don't think that we need to -- that the 6672 necessarily needs to taint, in any way, the package performance study, but we

would be interested in hearing from you about any interactions between those studies.

For example, what happens after the Sandia study is ultimately complete? What are the implications for 6672? Does the Commission need to go back and review that?

And I think there are some people around the table who are going to be very interested in what exactly, Bob's question, what exactly are the implications of 6672, and I think that may lead us to a lot of issues. We'll revisit this again when we get there.

Let's start with introductions around the table. Do you have a quick question? Because I don't want to go out here and get us off, but if you have a clarifying question.

MS. GOFF: No. It's just a request that even though they're going to go around and identify themselves, if there's some way to have a list for those of us in the audience as to who, their position or something, that would be very helpful.

MR. CAMERON: Okay. Thanks, Jackie. There should be -- and I'll ask the NRC staff to see if they can get this. There should be a participant list. All the participants have one, but there should be a list that was supposed to be available at the counter.

So if we could get that for you, then -- yes, I'm

gathering that now. We'll get that for you. It may be a little bit late in the process, after the introductions. So I hope it will still be helpful for you.

But let's start with the NRC staff and go to John Cook. If you could just give us name, affiliation, your interest or concern in this subject.

MR. COOK: Sure. I'm John Cook, with the Spent Fuel Project Office. I'm a Senior Transportation Project Manager. I was a Program Manager in the 6672 effort.

MS. SHANKMAN: Good morning. I'm Susan Shankman. I'm with the NRC. I'm the Deputy Director for Licensing and Inspection in the Spent Fuel Project Office. Transportation is one of the areas in our office.

MR. HADDER: John Hadder, with Citizen Alert, Northern Nevada Coordinator, out of Reno, Nevada.

MR. CAMERON: Thank you, John.

MR. LUNA: I'm Bob Luna. I'm a consultant to Sandia for the summary paper on 6672 and a former employee, a retired employee of Sandia.

MR. CAMERON: So now we know where you're from. All right.

MR. LEE: I'm Bill Lee, with NAC, but representing the American Nuclear Society.

MR. LAKE: Good morning. I'm Bill Lake. I'm with the Department of Energy's Office of Civilian Radioactive

Waste Management.

MS. TREICHEL: Judy Treichel, the Nevada Nuclear Waste Task Force, and we are a public advocacy group and believe that all of the Federal agencies need their feet held to the fire on this whole issue.

MR. CAMERON: If you could just make sure the mic is close, it will be better for the people in the back there. Thanks.

MR. BOYLE: I'm Rick Boyle, with the Department of Transportation. I'm in the Research and Special Programs Administration, and I head up the Radioactive Materials Branch in the Office of Hazardous Materials Safety.

MR. ALCOCK: Good morning. I'm Bob Alcock. I'm a Senior Policy Advisory for Transportation Issues at the Department of Energy, in Washington.

MR. HALSTEAD: I'm Bob Halstead. I'm a Transportation Consultant and I'm here today in my role as Transportation Advisor to the State of Nevada, Agency for Nuclear Projects.

MR. DILGER: I'm Fred Dilger. I'm a Transportation Planner for Clarke County, Nevada.

MR. BLACKWELL: I'm Kevin Blackwell. I'm with the Federal Railroad Administration, Department of Transportation, out of Washington, in the Hazardous Materials Division, and I deal with the radioactive

materials issues at the D.C. level on radioactive materials for transportation by rail.

MR. SORENSON: Good morning. I'm Ken Sorenson. I'm the Manager of the Transportation Safety and Security Analysis Department at Sandia National Laboratories, and our department conducted the two studies for the NRC.

MR. DOERING: Tom Doering, with Electric Power Research Institute. We are supporting the utilities and the DOE in reviewing the technical side of transportation and disposal.

MR. OTT: I'm Bill Ott. I'm with White Pine County, which is Ely, Nevada, Nuclear Waste Project Office.

MR. BAUGHMAN: Mike Baughman. I'm a consultant to Lincoln County, Nevada. Lincoln County has a highway/rail corridor site in it, as well as intermodal facilities.

MS. JOHNSON: Abby Johnson, Nuclear Waste Advisor to Eureka County, Nevada. We are under consideration for a possible rail route through the community of Crescent Valley in Eureka County.

MR. BENSMILLER: Good morning, everyone. I'm Bill Bensmiller. I'm the Federal Motor Carrier Safety Administration State Director for Nevada, primarily work with truck and bus safety issues here in Nevada and with the Nevada Highway Patrol.

MR. CAMERON: Okay. Thanks, Bill. And I think we

can maybe move that down in front of Bill Ott, and then I'll pass this one over here. All right. Well, thank you. Thank you, everybody, and thanks for taking the time to be here today.

Susan Shankman, who is the Deputy Director of the Spent Fuel Project Office, is going to give us a brief welcome and overview of NRC responsibilities. Susan has been with the NRC since 1982, in a variety of regulatory jobs, not only on the materials licensing and regulation side, but also on the reactor side.

She has a doctorate from the University of Southern California, but she was born and brought up in New York City.

MS. SHANKMAN: Yes.

MR. CAMERON: So, Susan.

MS. SHANKMAN: Good morning. I always ask Chip to say that, so that when you hear my accent, you're prepared. Coming out here on the plane, I sat next to a guy and he said "Have you ever or do you now live in New York City?" And so.

I'm happy to be here. I will try to make my opening remarks brief. First of all, I think we have a lot of people here who are familiar with the issues, are familiar with terms like NUREG-6672 and the modal study and those things, but I also think there may be people here who

are not so familiar with it.

I will try and I hope we all around the table will try not to speak in any acronyms. This is an issue that I know, from my own personal, living next to the railroad in Garrett Park, Maryland, is a personal issue and it's not only an issue to talk about in abstracts and numbers and NUREG documents.

It's a bureaucratic disease that creeps up on you when you've been in the Federal Government and it's not necessarily the way -- it's shorthand and it's not meant to exclude anybody in the discussions.

So what is the NRC? Now that I'm not going to use acronyms. It's the Nuclear Regulatory Commission and we were created and are an independent Federal regulatory agency. And when you say that, people say, well, what is independent.

The best way I can describe it is that we make decisions on technical and scientific merits, and that is the way the agency functions. Our goal, our mission is very simple. We are meant to protect public health and safety in the use of radioactive materials that are licensed under the Atomic Energy Act.

We're experienced, since 1984, in regulating all kinds of uses of that radioactive material, either reactors, materials, medical uses, commercial uses, and transportation

is part of the area that we regulate.

We do that, all of your regulatory activities are in a sequence or maybe a circle, because they don't stop once we set standards, which are called our regulations or rules, and after that, we will issue approvals, whether they be licenses or certificates of compliance for transportation packages that are geared to meeting those standards.

We publish guidance and information documents and our NUREG series are a part of that. We also perform inspections to be sure that people are adhering to the standards as they have been set. We enforce compliance with those standards through a series of violations and graded enforcements and fines and the whole other system that, if you're interested, I can explain.

But we also initiate research to be sure that the standards that we set do ensure public health and safety. And the package performance study and the reexamination of spent fuel shipment risk estimates are part of those research efforts.

It's a continuous process and, in fact, in the area of transportation, the Commission, in 1977, directed us to continue to reevaluate the risks of transportation. So that these two documents we're going to talk about today are part of that research effort and I would -- I guess Chip mentioned and we will talk about how you can make comments

on any document that we have.

And I also wanted to point out that the regulations, the standards for transportation are also, right now, under review in certain aspects of them and on the table out there you will find a document that looks like this and it announces what we're thinking of changing in the standards on transportation.

We had a public meeting last week and we're going to have another one in Atlanta on September 20 and another one in Oakland, California on the 26th of September.

So I know, if you're here interested in transportation, I wanted to make sure you were aware that that is going on at the same time, because it's a different aspect, but it's also an important part of the regulation of transportation.

In terms of the roles related to the spent fuel transport and transport of radioactive material in general, it's important to understand that the NRC is part of a system that is not only the NRC. It includes nuclear utilities for spent fuel as shippers, and also DOE as the shipper of high level waste, and then there are carriers, which are the rail and trucking companies.

And you see we have a representative from the Federal Highway Administration and the Federal Rail Administration, and they are the modes that regulate the

transportation through rail and truck in the U.S. Department of Transportation.

The NRC and the states have a very important role in routing, so that -- and tribal councils, also, to some extent. And emergency response is a local, state and tribal initial response. There are HAZMAT teams, there is Federal assistance available, and advanced notification is made to governors' designees of transportation.

We also have an advanced notice of public rulemaking out that speaks to notification of tribal councils.

So it's a system and this part, this discussion we're going to have today is part of the system.

Okay. What do we hope, maybe as the manager of the group that's working on this, what do we collectively hope to have happen today? We'd like to present the spent fuel transportation risk study that we talked about. We want to talk about the discussion paper, not only how it's said, but what it says. We want to focus this afternoon on the package performance study, which is the one we're going to do, and continue what I think has been a very constructive dialogue.

We started it in November and December. Many of you were there in Henderson, and also in Washington, when we had meetings. As we developed the scoping for this study,

we had, I think, a lively dialogue last week about Part 71, which is the transportation standards, and it's important to us, as an agency, to keep that dialogue going.

We welcome comments on what we're doing and I think, with your help, we can continue that constructive dialogue, and with Chip's help, too.

MR. CAMERON: All right. Thank you, Susan. I think we should move right into 6672 at this point. If there are any questions in regard to the items that Susan just went over, we can pick those up when we get into 6672.

John Cook, from the NRC staff, is going to talk a little bit about the genesis of 6672 and John is a Senior Transportation Specialist in the Spent Fuel Project Office, the office that Susan is the Deputy Director of, and he is the Program Manager for NUREG-6672, the reexamination of spent fuel shipment risk estimates.

After John is done, theoretically, would be the most appropriate time to hear some of the comments that Bob Halstead may be alluding to, but I'm thinking that it might be better to have Ken Sorenson just tell us a little bit about what is in 6672 and then open it up from there.

But does anybody around the table have any objections if we do John and then Ken, Ken talks about the substance and John is mainly talking about the genesis of it?

[No response.]

MR. CAMERON: Okay. Well, let's go to John first and then we'll get Ken up here and I'll introduce him at that time. John?

MR. COOK: Thank you, Chip, and good morning, everyone. I want to take a few minutes this morning to provide you with some background on the reexamination of spent fuel shipment risk estimates, which I will just call a reexamination from now on, if that's okay with you.

I hope to be able to explain to you the fit of this study with the other studies, transportation studies that we've done in the last several years, what factors led us to begin this study, what the analysis contains basically, and what our view of the results are.

From this slide, you can see that the NRC has been studying the risks associated with radioactive material transportation for more than 20 years, beginning with the first effort that you see at the top of the slide, which is the final environmental statement, that's what the FES stands for, on transportation, but we generally call this 0170.

This is our baseline document of transportation risk. It looked at the risks from transporting all radioactive materials by all modes and included estimates of the doses that were due to both incident-free and accident

-- potential accidents.

The next study, done in 1987, is usually known as the modal study. It was a narrower effort, just looking at spent fuel shipments and, in particular, spent fuel shipment accidents. What it tried to provide was better information about should a spent fuel package be involved in a very severe accident, what would be the possible release fraction from a package if it were involved in such an accident.

Which brings us to the reexamination, which was completed and published here in March of this year.

It, like the other two studies, is an analysis. There was no physical testing involved in these studies. It, too, focuses just on spent fuel and tries to provide an updated assessment of both incident-free and possible accident doses.

And then later today, we'll be also talking about the package performance study, which, like the modal study, takes a look at how packages might perform under severe accident conditions, this time, though, with the likelihood of physical testing being involved in that project.

As Susan mentioned, the NRC performs a continuing monitoring of spent fuel transportation activities. First, let me explain that as we saw in the previous slide, the NRC has had 20 years of studying risk. We've also had 20 years of monitoring actual spent fuel shipments and NRC certified

packages, shipped to buyer licensees under the rules of the U.S. Department of Transportation, have protected public health and safety during that period of shipping.

But the question that arose in the mid 1990s was what about the future, it appeared that there was an increasing number of shipments likely, either to ship spent fuel to a monitored retrieval storage facility or to a repository.

Another change factor was that the fuel that would be shipped would be older when done so; that is, less radioactive. But the packages would be -- to ship them, would take consideration of that fact and would be larger in capacity.

Also, the routes that would be used to make the shipments would be different, in that the original 0170 effort envisioned a reprocessing system, which, of course, never developed. So now we're looking at the different kinds of routes that you would see in shipments to a repository or centralized storage facilities.

Again, the last new factor is that the new data and models that are available, and, again, an example of that is the modal study.

So we went to Sandia and asked them to take a look at the 0170 spent fuel shipment risk assessment and to redo that analysis using these new tools and information.

As mentioned, certainly, the important factors in reexamination, including looking at shipments to storage facilities and repositories, but that's not the only consideration. As mentioned, we also ship spent fuel -- well, we don't ship, but spent fuel is currently shipped now.

So we have here a generic assessment, as was 0170, and it is not a facility-specific assessment.

Another objective in doing the study was to look at current cask designs, including, in this instance, looking at the closure system. This is the first time that the behavior of the closure system has been studied in some detail.

We also wanted to assure that we used the latest radioactive material risk code, RADTRAN-1, which is a code, I believe, many of you are familiar with, was developed for us by Sandia to do the original NUREG-0170 effort, and that code has been maintained over the years and is now at Version 5. So we wanted to use the latest version of that code in order to get our comparisons from the original study to this.

The results show that the reexamination of risks are less than those that were estimated in the modal study, which were, in turn, less than those estimated in the 0170 report.

The other, I guess, output from the reexamination effort is really input to the package performance study, in that it identified some candidate topics for the review in the package performance study.

I want to go back to the NUREG-0170 for just a minute to review its findings, because that is important. Again, it looked at all radioactive material shipments, about three million. It concluded or the Commission concluded, based on that study, that risks from shipments are small and that the packaging standards provide adequate protection of public health and safety.

And with respect to spent fuel, looking at that part of that analysis, what the reexamination tells us is that the 0170 estimates bounds the spent fuel shipment risk estimates for future shipments, since the reexamination and modal study estimates are both less than those originally estimated in the 0170 effort.

And so we believe that the previous conclusions that the Commission reached with regard to the fact that transport risks are small and that the regulations are adequate also remain valid.

Now, with respect to the report itself, we have the hard copy, which is this here, which I can -- we can provide additional copies, if you would like to sign up for that in the back of the room. But we are trying to go to a

CD format, because only Volume I is published in hard copy, because of the color, reproduction costs in the Volume II. So we do have a CD version which contains both Volume I and Volume II, or you can go out to the web page, as noted on the sheet here.

Finally, your package contains a discussion paper, which is an effort to distill the some 500-plus pages of the reexamination effort down into hopefully a manageable form, and we are looking to extend that effort down to a plain language brochure for public consumption, and perhaps later today you can help us in that effort.

With that, I thank you for your attention, and turn it back to Chip.

MR. CAMERON: Thank you, John. We're going to have Ken Sorenson, from Sandia Labs, put a little bit more detail on the conclusions and recommendations of the study for us, and then open it up to discussion from all of you.

Ken, where is the best place for you to -- it's wherever you're comfortable. All right.

While Ken is going down there, let me tell you a little bit about who he is. He is the Manager of the Transportation Safety and Security Analysis Department at Sandia National Labs and he has had about 14 years experience addressing the technical issues associated with the transport of nuclear materials, and this includes such

things as failure mode analysis, systems analysis, standards development, and risk assessment.

And his current responsibilities are the management of Sandia's transportation projects for the NRC, as well as transportation programs for the Department of Energy and other Federal agencies and private organizations.

He is on a number of groups, such as the ASME NUPAC sub-group, which is chartered to write design rules for transportation containment. He has also served on various other committees, such as the International Atomic Energy Agency committee that deals with radioactive material transport.

Ken, I'll turn it over to you at this point and then after you're done, we'll open it up for discussion and questions for both Ken and John.

MR. SORENSON: Thank you, Chip. Good morning, everybody. Let me say we're pleased to be here to share the results of the study that we just conducted for the NRC.

I say we. We have the principal technical consultants with us today, as well, and I'd like to introduce them now.

I have Dr. Doug Ammerman, who is the structural analyst; and Dr. Jeremy Sprung, Risk Analyst; and, Dr. Joe Akosky, who is our thermal analyst.

Also, Dr. Ruth Wymer, who has recently left

Sandia, is now at Jason Associates, was a principal author, as well, on the report.

The report, Reexamination of Spent Fuel Shipment Risk Estimates, NUREG CR-6672, is the subject report that we performed for the NRC. I will refer to it in this presentation just as 6672.

I'll give you a little bit of just the contents of the presentation, so you can see where we're going with this.

First, what I would like to do is give some overall general conclusions that we derived from the report and having those conclusions in your mind as we go through the processes and methodologies, I think it will be clear where those processes are headed.

Then we will talk a little bit about the background and genesis of 6672, and then compare the methodologies that were used in 0170 and the modal study with 6672, to see how the examination of transportation risks have evolved over the last 23 years.

Talk some about the conservatisms in 6672 and then, finally, list some specific results that we got out of the report, and then you'll be able to tie into context the conclusions up front with the specific results that we talk about at the end of the presentation.

So what are the overall conclusions of 6672?

First, the transport risk that were estimated in 6672 are better estimates than those that were estimated in 0170. As John mentioned a little bit earlier, there are several reasons for this.

First of all, there's more advanced analysis techniques available than there were 23 years ago. There's more detailed evaluation of the transportation routes available, a lot better -- new and better data is also available, over the past three years, that's been developed that can be applied to these sorts of analyses.

Secondly, non-accident and accident transport risks are lower than those estimated in 0170. And so we could still say that the applicability of the transportation regulations are still valid based on these lower transportation risks relative to 0170.

A little bit of background. Why now do we conduct 6672? Well, as John mentioned earlier, we expect to have higher increases in spent fuel shipments than what were considered in 0170 and the modal study. Also, shipment routes and transport casks differ from what was analyzed in the past two studies, new cask designs and better data on transport routes are available today.

Also, there's better risk assessment tools and better analysis techniques to analyze the response of a cask to mechanical loadings and thermal loadings.

But we didn't want to reinvent the wheel in this process of the NRC in looking at 0170 and then the modal study. So we did use both of those studies as a jumping-off point to conduct 6672.

In particular, for the modal study, some things are very similar or some of the same elements are the same in 6672 as in the modal study.

For example, the accident event tree, and I will discuss in a minute exactly what that is, but the event trees that we used in 6672 are the same that were used in the modal study.

We did refine some of the waste site hardness data that the modal study had, but the actual event tree scenarios and the probabilities of those scenarios are the same.

The accident speed distributions and the fire duration distributions that were used in the modal study are the ones that are used in 6672.

6672, as well a the modal study both use finite element analyses to calculate or estimate the response of the cask to severe accident mechanical loadings and thermal loadings.

And you will see kind of a link between this study and the issues, in determining dose risk to the public in the event of a severe accident, and then look at that

process and compare the three different studies that have been done, so that you can really see how this process has evolved from an analytical standpoint.

And you can think of the process along the top as a series of links in a chain and let me just describe each one of those very briefly.

The first one is severity fraction, and what that is is development of these event trees, and that's looking at specific scenarios that could occur that would define a transportation accident. It could be a train that derails and then the cask hits a bridge abutment and then there's a fire succeeding that. So you have a series of events that lead to a consequence in this accident.

Also, in these event trees, each one of these events has associated probability of occurrence, probability of actually happening.

Also, there is a consequence level that is assigned to that particular accident. So the event trees really define the envelope of scenarios that are considered for these accidents.

One thing I forgot to mention, in parentheses up there, these considerations in 6672 are for severe type accident scenarios, above and beyond what's in the hypothetical accident condition regulations.

The next step in the process is given the scenario

and the probability of occurrence and the likely consequence, is to determine how the cask would respond, both from a mechanical standpoint and a thermal standpoint, to these types of loadings, and once you do that, then you can determine what is the source term that is available for release to the environment.

So you have a scenario, probability of occurrence, a consequence, how the cask responds to these loadings, and then, given that, how much material is available for release to the environment.

That gets you about half the way there. You've got a release to the environment, but you really don't have a way at this point to analyze what is the dose risk to the public.

And you do that through route analyses and you determine what are representative routes that one could consider, along with population densities along these routes, and then, given the population densities in these representative routes, you can finally determine what is the dose risk to the public for a particular scenario that you're looking at or class of scenarios that you're looking at, accident scenarios.

So given that brief overview of the process for determining dose risk, then, let me go column-by-column and show you how the methodologies compare and how this process

has evolved.

For the severity fraction, 0170 basically used expert judgment to look at the accidents and the likely consequence of those accidents. The modal study, in 1987, did a good job of defining actual accident scenarios and associated probabilities with those scenarios to develop these event trees.

They also looked at three different waste site hardness targets. If there is a truck accident and the cask rolls off the truck and it hits the side of the road, what is the hardness of that surface. So they looked at three different hardnesses, with associated probabilities.

For 6672, we used basically the same event trees with associated probabilities, but we also refined and expanded the waste site hardness configuration.

We looked at five different waste site hardnesses, with associated probabilities, and also used the GIS technique to better refine the occurrences or probabilities of a particular waste site hardness along a route.

What we found actually was that the probability of a hard surface through this methodology was actually higher than what was computed in the modal study.

For cask response and fuel response to these particular scenario accidents and consequences, then, for the NUREG-0170, basically, expert judgment was used in that

process. For the modal study, they did a finite element analysis on the cask shell and then from the response of that shell analysis, they looked -- they inferred the response of the fuel behavior.

For 6672, we did a finite element on the entire cask, including the closure and the bolts. We also did a separate analysis on fuel response, so that we could actually estimate the percentage of fuel that's failed due to an impact or thermal loading.

For source term, again, NUREG-0170 was basically expert judgment. For the modal study, they considered the release of the fuel from the fuel assembly into the cask. They did not look at deposition of material on the inside of the cask before it was released to the outside of the cask.

For 6672, we looked at failure of the fuel, of the assembly, and how much release of the radioactive material inside the fuel would be released to the inside of the cask; looked at how much was deposited on the inside of the cask, and then looked at that fraction to see how much was available for release to the environment.

And we looked at radioactive materials in four different physical classes -- gases, vapors, particulate and crud. Certainly, the transport of these different types of physical states of radioactive material varies greatly.

The next part of the analysis, we've got the

scenarios defined, the probabilities, the consequence, how the cask responds to these severe mechanical inputs and thermal inputs, what is the source term that has been released or available for release to the environment.

And the next part of it is to do the route analysis. For NUREG-0170, they looked at two generic routes, one truck route and one rail route. The modal study did not consider this aspect of the route analysis.

6672, we really did a very exhaustive and rigorous analysis of routes. We started off looking at all of the generation sites, nuclear reactor sites that would be shipping, assumed that there would be candidate six storage sites, a potential for six storage sites across the nation, and a potential for three repository sites at different locations, and using the combination of all of the generator sites, the storage sites, and the repository sites, we looked at 471 real truck routes and 471 real rail routes to establish the parameters for the route analysis.

We broke the routes up into route length and then the root length into three segments based on urban, suburban and rural population densities.

So given those densities along the route, then we can establish population densities for the entire route.

With all of those different real routes, then, we developed distribution curves for these parameters and

generated 200 representative truck routes and 200 representative rail routes, by which we could assess transportation risk to the population, based on release of material due to these severe accidents that we're looking at from the event trees.

We also looked at four real routes to make sure that they were bounded by the representative routes, and we also looked at the two generic routes that were covered in the 0170 report.

And, finally, for calculating doses to the public, as John Cook mentioned, in 0170, we used RADTRAN-1. It's a computer risk assessment computer code used to estimate dose risk to the public. The modal study did not calculate specifically dose risk and 6672 looked at -- well, used RADTRAN-5 to estimate dose risk.

Some of the more seminal changes in RADTRAN-5 is how source term is handled and how exposure pathways are handled. For example, 0170 looked at two exposure pathways. One was inhalation and the other was resuspension of material.

For RADTRAN-5, we looked at inhalation, resuspension, and, also, ground shine and cloud shine.

So that's the process and the evolution of the analysis between the three reports. Some of the convervatisms that are still in 6672 that we think are

important to point out are grouped into impact analysis, thermal analysis and source term.

For impact analysis, one of the main conservatisms is that all of -- there are three orientations that we looked at for the drops. One was the end drop, the other was the center of gravity over the corner, and the other was the side drop.

And for all the end drops and the center of gravity drops over the corner, we were assuming that that was on the closure end of the cask. Clearly, the probability could be on the other end, as well, but we looked at only at the closure as a conservatism.

One of the things I neglected earlier about doing the cask analysis, we looked at four different speeds of impact. One was 30 miles an hour, then 60, 90, and 120 miles an hour impact onto these different soil surface hardness. So we really, I think, enveloped a very wide range of severity of potential accidents in these analyses.

The second conservatism under the impact analysis is that all the kinetic energy developed in this cask in the event of an accident is assumed to go into cask deformation. So that's a very conservative assumption.

Clearly, I think in real accidents, some of that kinetic energy will be transferred into rotating the cask or changing the velocity in some other direction.

We assumed that all that kinetic energy went into deformation of the cask, and that's a pretty strong conservatism.

Finally, we did not look at canistered fuel, a payload configuration common with the dual purpose type of shipment, where you take bare spent fuel, you canister it in that canister, you put it in storage, and then when you're ready to ship it, you take that canistered fuel and you put it in a transportation cask.

The canister itself acts as another containment barrier for the shipment, so that's a level of conservatism that is not considered here. This is an issue that we will bring up in the issue study and, when we talk about it this afternoon, is something that would probably be worthwhile to look at.

For the thermal analysis, we assumed that all fires are optically dense and completely surround the package, fully engulfing for the entire duration of the fire, and we think this is a conservatism. Typically, fires, if they're a long duration fire, they move from point to point and don't stay in one location.

The last one is source term and for source term calculations and release calculations, we looked at three-year-old cooled fuel with high burn-up, and this is a very strong conservatism.

The spent fuel inventory that will be ready to ship in the 2010 timeframe will be on the average of about ten-year cooled, with a lower burn-up.

This has an effect of increasing the curie content in the package by about a factor of four. So that's a strong conservatism we felt was important to have in there, because source term is an important parameter for computing dose risk.

So what are the main conclusions of the report? First of all, the accident risk results, both for truck and rail. The transportation risk estimates in 6672 are three to four orders of magnitude lower than the accident risk estimates in 0170.

Joe, could you go to the next slide, please?

That's a blowup of the histogram there. I won't repeat the numbers, because they are quite small, but to give you a relative scale for rail and truck between 0170 and 6672, I think you can see it's a pretty dramatic change in transportation risk on the lower side, even though we do feel that there are still conservatisms in this report.

For non-accident results for rail shipments, our estimates in 6672 are about two-thirds of the transportation risk estimates in 0170. And for highway shipments, our risk estimates, dose risk estimates or risk estimates for dose are about one-quarter of those in 0170.

There's the bigger blowup of the histogram there.

So in conclusion, I just want to say that we feel that this is a better analysis than the previous two studies, largely because there's better techniques available to conduct the analysis and better data available.

And since it is -- the transportation risks are estimated to be less than those computed in 0170, the regulations that the NRC has are still appropriate and valid for shipment of radioactive material.

Thank you.

MR. CAMERON: Thank you very much, Ken. I think a legitimate issue to lead off with is the one that Bob Halstead mentioned earlier, which is, okay, we have the study, 6672, that Ken and John just described, how will that study be used in the Commission's regulatory activities.

And I'm going to ask Susan Shankman to give us an answer on that, and then we can get some -- still see if there is some clarification needed around the table.

Susan?

MS. SHANKMAN: Okay. I think the bottom line is that if the Commission is aware that the risk from transportation of any radioactive material, including spent fuel, is greater than the risk estimated in the final environmental statement that was done in 1977, we would have to look very hard at whether our regulations were still

valid.

When we did this latest reexamination, what we were looking at is was the risk estimate of shipping spent fuel still bounded by our original study; in other words, the bottom line was has the risk estimate increased, since we know that there is a campaign about to begin, whenever it begins, and it will be significant and it was important to have information early on about whether we needed to do a more detailed look at the risk estimate.

So in answer to your question, Bob, I think the answer is simple. If we have information that the risk estimate is larger than 0170, then we have to look at that and look at our regulations. And we'll use any information that we get, validated, but any information we get is important information.

MR. CAMERON: So given that 6672 was to reexamine, to see if the 0170 risk estimate has changed, what regulatory documents are tied to 0170 that may help people to understand how these studies are reflected in the regulatory framework?

MS. SHANKMAN: The standards, Part 71, that regulate transportation for NRC.

MR. CAMERON: Okay. Thank you. Bob, do you want to comment on that?

MR. HALSTEAD: Well, the State of Nevada has

sought to have NUREG-0170 reopened for the 20 years or so that I have followed the State of Nevada's program before I came to work for them, and certainly since 1989, we have sought a reexamination of the modal study.

So in terms of the Commission's decision to reexamine these earlier risk studies, we endorse that. Unfortunately, the way the Commission chose to approach those issues with this particular report creates a very difficult situation for us.

I don't know if you want me to start off with a discussion of why we believe the process was wrong here or if you just -- if you -- I don't understand, Chip, exactly how you want to proceed with this discussion.

I'd love to open this. I have a handout that summarizes most of my comments, and I think I can start a discussion on these issues, but I don't want to dominate this conversation at the beginning.

MR. CAMERON: I think it would be fair, before going to the substance, some of the substantive points in the study, to hear everybody on what they think about the process.

MR. HALSTEAD: Let me make a few critical statements about the process. First of all, we find it appalling that this report was developed in secrecy. Now, you can use some other word to describe the way it was

developed and I don't want to get into a witch hunt over who made the decision and why, but the bottom line is that on at least three occasions, in May of 1998, December of 1998, November of 1999, the State of Nevada requested an opportunity to review the draft report.

I think that many of the technical issues might have been resolved. I think it works to the Commission's disadvantage, frankly, that they chose not to follow an open public process.

Secondly, while there are many impressive technical aspects to this report, a key problem is that the report ignores all of the previous criticisms of NUREG-0170, the modal study, RADTRAN, and, in general, the use of probabilistic risk assessment.

Certainly, there should have been, at the beginning of this report, a summary of the technical criticisms, and we're not just talking about stakeholder concerns that may be parochial. We're talking about major, general technical issues about methodologies and data sets.

And indeed, as I review the references, and maybe I missed one, it's extraordinary, in the entire report and its appendices, I found one reference to the minutes of a meeting held at the Offices of the Association of American Railroads, and I found no other reference to any document that contained any criticism of the way the way the past

reports have been done.

Thirdly, peer review is very difficult when you're involved with issues as controversial and as technically complex as the issues we are addressing here.

The peer review that was commissioned by Commission staff for this report, on the one hand, involved individuals who are among, I dare say, the two or three dozen people in this country who have the technical expertise to do the kind of peer review that was required.

On the other hand, in obtaining that technical expertise, those parties are all principals to this dispute. This goes back, for example, to a problem with the peer review of the original modal study, which was done by the Denver Research Institute, and they were clearly independent of the process, but it's also clear that they did not have sufficient technical expertise in the issues to do an appropriate peer review.

I don't know that I have the full answer to this, but I would say, at the very least, in addition to the parties who were involved in the peer review, some additional independent peer reviewers should have been brought into the process.

Finally, most of these issues would have been addressed if the Commission had decided to develop this report as a generic environmental impact statement or a

programmatic environmental impact statement, with a full and rich public review and comment process.

I'm not sure what the remedy is now. We're stuck with a Commission decision made, I would guess, somewhere around 1995, although it's not exactly clear to me when the decision was made to proceed.

I want to believe the statements that have been coming out of the Commission for the last 12 months or so, that the Commission is going to proceed with these types of issues in a different way in the future.

So I'm not sure what the remedy is here. Three-quarters of a million dollars or so have been spent on this study. Many people will be impressed by the credentials of the people who prepared the study and the references that are cited in the study, and the elegance of the modeling work.

Certainly, the State of Nevada's preference would be to have this report reissued as a draft generic environmental impact statement. Since I know that there is a very low probability of such a high consequence event occurring, I won't say that that's our formal policy position and that nothing else would make this a useful endeavor, but I think we'll have to wait, over the course of the day, and I'll try to come back to this at the end of the day.

Given the deficiencies that we see in the report, what remedy best serves the public interest?

MR. CAMERON: Thanks, Bob, for starting us off on that. And what I would like to do is to get some reaction from Susan Shankman, first, but then go to the rest of you for comments on the process issues that have been brought up.

Eventually, we need to get to the substantive issues in the report and it may become clearer, Bob, after we see what some of the criticisms are or critique of the substantive findings of the report, what the implications of this process discussion might be.

But could we go to you, Susan, to respond to -- to say some things about what Bob said? Then we'll go to Judy.

MS. SHANKMAN: Right. The one thing I can tell you is that for the accident analysis and severe accidents, they can be reconsidered in the package performance study. So any comments you have on that we need now as we scope out that study.

For the incident-free transportation risks, that would need a supplement to this NUREG and I don't think that -- obviously, we haven't planned to do that at this point, but if your comments were such that that's something we should plan to do, we'd certainly consider it.

As we've discussed in other venues, there isn't an

unlimited amount of time, energy or money, but if we can focus on the areas of concern, that would be very helpful and we would do that.

So in other words, the document itself is not going to be reissued, that's not our plan. But if you have specific comments on incident-free, we need to know those and we can look at what we can do with that.

In terms of accident, they definitely considered part of the package performance study.

Does that answer your question, Bob?

MR. HALSTEAD: I hope so, Susan. I think that the difficult issue for us is that this document is out there with the imprimatur of the Commission on it and the parties who participate in licensing proceedings before the Commission may choose to use it.

Parties who prepare environmental impact statements or environmental assessments pursuant to NEPA may use it. And so for me to say that it doesn't cause us problems, regardless of how you plan to use it at the Commission, would not be correct.

But I appreciate your clarifying the Commission's intent.

MS. SHANKMAN: And I appreciate it. I know that, you know, we have a new agency electronic system through the internet, you can get access to documents, and the peer

review that was associated with this NUREG has been put into the system so that you can find one without finding the peer review, and we would do that with comments that we got on the NUREG, if the system allows us to do it.

So that somebody looking up this reexamination could see all of that information. So that's another way to have the information available.

MR. HALSTEAD: I'd like to make one more general comment on process, and then I'll be quiet for a while.

At the end of my handout, I quoted a couple of paragraphs from the rather intensive peer review conducted by Lawrence Livermore Lab. I suppose it tells you something about how boring my life is, if I say that reading dueling memos between Bob Luna and Larry Fisher is, for me, as exciting a heavyweight championship fight between Muhammad Ali and Joe Frazier.

But, in fact, for those of you who enjoy this kind of work, I heartily recommend that you read those memos.

The point I'd make here is that Larry's criticism of the certainty with which these risk reexamination numbers are offered is pretty much the same criticism that many of us have made of Larry Fisher's work, going particularly back to the modal study and a workshop that we all -- many of us attended in 1989.

I guess part of the process, as the Commission

emphasizes risk-informed decision-making, is to be more honest in communicating what these risk numbers do.

Now, the State of Nevada commissioned a report ten years ago based primarily on a review of the Commission's reactor safety study, arguing that when you use probabilistic risk analysis, you must clearly explain to the public exactly what frequency assumptions and exactly what consequence assumptions were used to derive the risk estimate.

That's not in this report. But more than that, there is an absence of technical humility in this report that I find disturbing. I mean, this report reads like documents that, in my experience, are written only by our lawyers and theologians.

There is an argument that if you just do enough rat and hypercube sampling, you could know within specified confidence limits how many angels could dance on a plutonium pinhead.

I believe that that is the case. This report says you can take these numbers to the bank and the real question is can you take these numbers to Federal Court, and that's what we're going to find out. I don't believe they will stand up to the kind of technical review that I expect them to be subjected to.

And I think that there should be some discussion

in the report and in anything that you present to the public about why we do probabilistic risk assessment, which I believe in, but why it's also important to explain how the numbers were derived, not hide the consequence numbers, and explain how we use these numbers in a society where many activities impose involuntary risk on citizens.

Thank you.

MR. CAMERON: Okay. We're discussing the process question here and we're going to go to others around the table. Bob led us a little bit into some of the substance issues, at least in the sense of critiquing the methodology that was used, and we'll get into those.

Maybe at some point you can tell us who the State of Nevada's theologian, high level waste theologian is. It may be Frishman, but he just left the room. Oh, he's back. All right. Judy?

MS. TREICHEL: Well, I have to make this statement, and it's not substantive, but the citizens here in Utah, in a lot of places, just are to broil and as their representative or one of them here at the table, I have to say, with the introduction to this and the groundwork that was laid, when you say that the study was prompted by the idea that spent fuel shipments will likely increase, and Susan then said we know the campaign is about to begin, whenever it begins, and you were talking about temporary

storage, as well as repository, I find that real troubling that NRC talks in those terms.

We are consistently and continually assured that NRC is absolutely objective. There's just a good reason to believe that Yucca Mountain would be tossed out, that Goshute would be tossed out, that this would never happen, and when you turn around and you see that the opening of these things would then trigger this sort of a study, and, as Susan said on her third graph, as a regulator, what we do is we issue approvals.

Well, yeah, you do. That's a problem. You shouldn't be in the business of just issuing approvals. This has got to be -- you got to be a tougher cop than that.

MR. CAMERON: Susan?

MS. SHANKMAN: Judy, we do issue approvals against the standards that we set and if something doesn't meet our standards, we won't issue an approval. So maybe that clarifies. We don't issue approvals absent a review against standards that we've set.

The standards are designed to ensure public health and safety. So we deny applications when they don't meet our standards, but we don't issue denials. We are in the -- we are obligated to follow the Congressional mandate to look at safe transportation, safe use of nuclear materials.

The second point, that we said there will be a

campaign, I'm relying on the Department of Energy's agreement, and although there is still litigation, that they will take spent nuclear fuel and high level waste at some point in the future, and whether it goes to a geological repository in Nevada or another repository or an interim spent fuel facility, whether it's private or public, that is not our concern.

Our concern is if the DOE follows through on their Congressional mandate, we need to know that transportation would be safe.

So I think you're jumping from there may be -- there will be a campaign, to it will be at Yucca Mountain. I don't think I said that and I didn't mean to infer that.

MS. TREICHEL: The NRC has already said that in their Goshute EIS, as I read to you in that hearing. But I don't want to argue this. I just hate the fact that it's all put down and it's a part of something else and this thing just starts rolling over, when you never really knew where it started and it's a lot of chicken-and-egg kinds of things.

But I needed to point it out and we should now go on to substance.

MR. CAMERON: Okay. Thanks, Judy. Let's hear from John.

MR. HADDER: John Hadder, Citizen Alert. I just

wanted to really emphasize one of the important -- a couple of important points. One about the public communication aspect that Bob touched on, and this is something the NRC really needs to take seriously and so does the Department of Energy and all the government agencies.

This probabilistic risk assessment analysis is not clear, it's not clear to the public what it means and why we have to really use it. The public says over and over again, well, why don't you do a real test, why don't you do a real test, why don't you do a real test, and we come back and we say to the agencies, well, why don't you do a real test, well, this is why.

So I think that that's something that really needs to be -- I think we really need to work on. And I have myself a lot of suspicions and a lot of concerns about probabilistic risk analysis.

One thing that's pointed out in one of the viewgraphs is the reason for the new study, 6672, is because we have more advanced analysis techniques. Well, let's not confuse more advanced analysis techniques with better analysis.

There's complexity. When you start working on more advanced techniques, you begin to add more complexity to the equations, to what you're doing, and there are implications of that.

And I think that the uncertainties and the propagation of errors in these types of analysis are not really properly addressed.

And these are all issues that come up with these kinds of analyses and the public has no sense of whether this is right or wrong or whether we should use it or not.

And that really needs to be addressed, to get any kind of public support for any of these programs.

MR. CAMERON: Thank you, John. That may go to some of the points that Bob raised about methodology, obviously, and we need to talk about that.

Does anybody else around the table have any comments on process? I think Susan indicated a couple of ways that, although 6672 wouldn't be reissued, there may be circumstances where there would be the use of a supplement, with a small "s", not a big "s," including any implications for 6672 that come out of the Sandia issue study.

But anymore process issues, around the table, before we go to substantive comments on the report? And I would -- on some of those substantive issues, I would ask the NRC and also Ken if they would respond, not in the sense of getting into a debate about it, but to make sure that they, one, understand the issue that's being raised and, secondly, if there is anything that you could offer that would shed light on that, that might be useful.

Bob started us off on the methodology issue and as I understand what you said, Bob, it's that some of the assumptions behind the use of the risk assessment were not made clear.

Could you just -- could we start off with that? Could you just put that back on the table for us again? Because I don't think you want to rely on my rephrasing it.

MR. HALSTEAD: Well, again, I want to say that my statement of how this issue should be resolved is based on a great deal of study that we have done, ironically, mostly of Commission sponsored documents prepared in the '70s and '80s regarding the use of probabilistic risk analysis in reactor safety studies.

We believe that in every instance where you provide a quantitative estimate of risk, that you must also explain the frequency information, the data that was used to calculate that risk, and you must also explain the consequence that was involved.

So for example, a way to elucidate the discussion of what these risk estimates mean is to always immediately provide the information on the worst case consequence and the probability of that consequence.

Interestingly, the Department of Energy, after many years of slugging it out with the State of Nevada and the Department of Energy, took this approach in their

transportation analysis, in their draft EIS for Yucca Mountain.

Now, I have criticized the substance of that discussion, the probability which they assigned to the event and the consequences which they assigned to the event, but I appreciate the fact that the Department of Energy is now willing to do that.

And an interesting result of that is that we now have a better understanding of how far the gap between the State of Nevada's analysis and DOE's analysis. We used to think it was orders of magnitude and now we see that on the consequence estimate, well, it's maybe a factor of two and maybe a factor of 40, depending on what assumptions we use.

I believe it shows growth both on the part of the Department of Energy in being more honest in providing information, which is, frankly, disturbing to stakeholders.

Now, on the other hand, I think it shows growth on the part of the State of Nevada's technical reviewers that we have been able to identify the extent to which we can use the tools, such as RADTRAN and RISKINE, that have been developed for the NRC and the department.

So I think that's a positive development. It doesn't mean that we aren't still an adversarial relationship over this, but we have a better understand of what the technical dispute is about and we're able to

communicate that to the public in a more accurate way.

I guess that's something I would make as a general comment, as the Commission proceeds on this risk-informed decision-making process generally, and, in particular, in a document like this.

All the numbers should be explained and they have to be explained in plain language up front in the executive summary.

MR. CAMERON: Let me turn to Ken Sorenson to make sure that he understands the point that you're trying to make in terms of all the numbers being explained and the fact that for every quantitative estimate of risk, the frequency and the consequences should be spelled out.

Ken, do you want to talk to this?

MR. SORENSON: Well, I think it's a good comment. We struggle with a very technical document like this and highly technical analyses to find the balance between making sure that you fully explain all the technical aspects of what you're doing and also make it readable to the general public.

And I won't argue that many parts of it could be made clearer and some of the assumptions could be brought out in a clearer fashion. Whether you actually explicitly state assumptions or you leave them in references that you have in the other documents, those are areas where we

honestly did struggle with in terms of how detailed to be with the assumptions that we made and the numbers that we used.

So I think it's a good comment. It's something that we can look at.

MR. CAMERON: And I think that was John's concern, too, is that -- is this just a question of making sure that the assumptions are spelled out in an understandable way or is it also the fact that there is some part of the analysis that was incomplete? I guess I would ask you, Bob.

Is it a question of elucidation and communication or are you concerned that there is some gap in the analysis, also?

MR. HALSTEAD: Well, I think when we get into a more detailed -- I'm not sure, again, exactly how you want to proceed with the discussion of specific issues. I mean, I can show you, for example, two paragraphs on page 3-17 where there are at least six questionable factual assumptions about issues that have a major impact on the determination of accident severity categories and the overall accident rate.

We could start going through details like that. I would say, as a general statement, that we are concerned both about the assumptions that went into determining accident category specification and accident probabilities.

We are also concerned about the assumptions and methods that were used to determine accident consequences.

I don't want to completely ignore two areas that are also important, because mostly when we talk about accidents, we're talking about accidents that involve releases.

There are some important issues that involve what people in the trade call loss of shielding accidents, where damage to the gamma neutron shield results in a potential for radiation exposures exceeding regulatory limits, without any release of radionuclides from the package.

And there is a major, major area of concern on our part with routine radiological impacts. But I think that the key issue that usually is in debate when we talk about these issues is how did you determine the probability of an accident that resulted in the creation of pathways out of the cask and sufficient damage to the spent fuel, so that there is a release of radionuclides.

And maybe that's a way that you might want to segment this discussion, to separate the discussion into routine radiological consequences and accident consequences.

MR. CAMERON: That's one suggestion, and I have another for you. Before we go on to that, let's hear from Mike and anybody else on these general issues. Mike?

MR. BAUGHMAN: Chip, I would just like to suggest

-- I think, obviously, the State of Nevada has done a rather -- has put a lot of time into thinking about this work that they have outlined on this, and he can get into a great deal of detail, and I respect that.

But I don't think that we have the time to do that, nor do I think it's an efficient use of our time. Rather, what I would like to hear is, we have a lot of people here, including the authors that worked on this, we have the NRC, they've had a chance to look at these points. They are well constructed, easy to understand.

I would like to get some reaction from the NRC as to if these issues were addressed, and, as I understand it, what the current study basically does is it takes better data and better methodology and applies it to the estimation of risk, and comes up with the conclusion that the risks are less than what we estimated before.

I mean, that's the underlying basis of this whole study. We think we used better data, we think we used better methods, and we came up with lower risk estimates.

Now, obviously, the state disagrees. They think you left out some things. My question to the folks around the table that are involved in this is if you incorporate these issues, if you address these issues, will the risk estimates be likely to go up or come down.

MR. CAMERON: I think that's a fair place to start

and I don't know if the NRC and Sandia are prepared to talk about that, but let's see if they are and let's have some discussion about what their response is.

Ken, do you want to start us off?

MR. SORENSON: Well, just a general comment. I think looking at the history of the studies, and I understand that new analyses does not necessarily mean better answers, but this has evolved over a period of 23 years and a lot of these practices are accepted in the engineering community as valid ways to analyze package response, for lots of different engineering applications.

I do feel that if we looked at some of the issues that come out of 6672 in terms of how they could be incorporated into the packaging performance study -- for example, a test, a full-scale rail test, high speed, and back that sort of thing into transportation risks, my sense is that the risks would still decrease once you better define the problem.

A lot of the reasons for the earlier higher transportation risk estimates is because we are, for lots of reasons, not able to better define the problem, so because of that, we had to make conservative assumptions on the analysis process.

As we can better define the process and have better tools with which to work, we can reassess the

assumptions that we make and thereby get better estimates.

I think as we do that, as we're seeing over the past 23 years, these actual transportation risk estimates are decreasing.

MR. CAMERON: Let me ask Bob Luna if he wants to elaborate on that.

MR. LUNA: Yes. I'd like to add a little bit to that. As I think the only person in the room who was actually here at the time of the inception of NUREG-0170 and as the project manager for that activity, I think I do own at least part of the work and the background for this activity.

NUREG-0170 was done in the 1974 to 1977 timeframe and as Ken pointed out, much of the risk assessment work was done in terms of expert judgment and engineering judgment, to sort out the factors that were important and to build them into RADTRAN-1.

0170 was subject to public scrutiny. All of the public comments were answered in a document that was also published, and so there was, I think, a complete understanding of what the public concern was about 0170 and how the work in it was handled and all the questions, as I suggest, are answered, were answered and incorporated into subsequent versions of the RADTRAN code, which I had control over as a manager at the laboratories when I worked there.

RADTRAN-2, RADTRAN-3 and RADTRAN-4 were all done under my watch and the goal in each of those was to improve the fidelity of prediction and to include the aspects of the analysis that, in fact, had been criticized.

I think that we are probably imperfect in doing that, but I think we got most of the significant content covered from the public comments with regard to RADTRAN during that time period.

So I guess I would take some issue with Bob's characterization early on of the history of probabilistic risk assessment and exactly how it was done.

I would also take some umbrage, I guess, with the concept that when you look at the processes in greater detail and you inject more detail in it, you do not understand less, you understand more of what is happening in the process and as you understand more, you're able to refine the way it's portrayed in the analysis.

And the work that was done on 6672 was an attempt to get more detail into parts of that analysis.

MR. CAMERON: Just let me clarify for the group what the response so far has been to Mike's question, which I believe was if the State of Nevada comments were addressed and given that this is speculative, do we think that the risk would go up or down.

Now, some of these issues that the State of Nevada

raised, I guess one question, are some of these issues going to be evaluated in the package performance study. So, yes, some of them are going to be evaluated there.

And, secondly, from what Ken and Bob said, you speculate that you don't think that the risk would be greater. Is that what you said? Okay. So at least that's one opinion answer for you, Mike, and we're still trying to figure out how to continue discussing these.

We were answering this question for Mike. Bob suggested taking a look at accident -- dividing it into accident and non-accident discussion segments.

And the other thing is go to through all of these vertical cuts, which I'm calling them, severity fractions, source terms, route analysis, whatever, that we may not be covering this afternoon.

Judy?

MS. TREICHEL: I just have a question for something I want to know and it relates to what John Hadder had said, where the public really wants physical testing of actual casks and I wanted to ask Bob Luna.

The now world-famous films, test films that have probably gone around the globe several times, and I'm sure Steve Kraft never leaves home without one, when were those made and was that part of the early development of RADTRAN or at what point did those play in? Because that's the big

thing that the public is always campaigning for.

MR. LUNA: Let's see. Those tests were done at just about the same time as RADTRAN-1, so 0170 was going forward. 0170 went from '74 to '77. As I recall, those tests were done in the '75 to '76 timeframe.

And so the fact of the matter is that the information that was generated from those tests was, in fact, incorporated into some of the failure models for the casks in 0170, but, in fact, a lot of the previous physical testing of other type B packages and other packages in general that were done at Sandia was also incorporated into 0170, as well.

So the answer is not specifically, but, in fact, the content and what occurred in those tests was incorporated into 0170 release models.

MR. CAMERON: Judy, do you want to be more explicit about what your point was there? Besides the actual physical testing, which I think is going to be addressed this afternoon, that the film should be -- there should be an update.

Do you want to say anything more about the film itself? I didn't know if there was another point you were trying to make there.

MS. TREICHEL: Well, I don't need to say anything about the film. There's got to be nobody in this room

that's never seen the crash test film, but I just wanted to put it into context as to what we're doing and the fact that I know Citizen Alert and the task force are continually being asked by people, so how come we can't get them to just do this, why do we have to rely on computer runs, why do we have to take their numbers and --

MR. CAMERON: Okay. I think that should become clear this afternoon explicitly. Let's go to Bob Alcock and then up to John.

MR. ALCOCK: Chip, if I might, I'd like to address some questions to Susan. Part of the basis for the regulations that the NRC has on cask performance and testing are based upon NUREG-0170. Correct?

MS. SHANKMAN: I'm not exactly sure. Are you saying -- it's not the scientific basis. It's the risk estimate to show that the regulations provided public health and safety in an environmental impact.

MR. ALCOCK: Now the NRC has an update, new information that shows the risks are lower than -- now, because of that, is the NRC proposing to change its regulations?

MS. SHANKMAN: No. The simple answer is no. We do have rulemaking related to Part 71. It's related to international issues and some other issues and we can talk about that, if you want, off-line, but the risk estimates in

the contractor report confirmed for us that our original risk estimates were conservative and, therefore, did not need to be opened for reexamination in terms of the regulations.

So does that answer your question?

MR. ALCOCK: Yes. Yes.

MS. SHANKMAN: Do you like the short answer better?

MR. ALCOCK: One final question, however, if I can ask you to speculate a little bit. What if the numbers went the other way and the risk estimates were found to be higher? I mean, how much higher would they have to be for you to reevaluate the regulations?

MS. SHANKMAN: You mean if the original 0170, we found the risk estimate was higher than that?

MR. ALCOCK: Yes.

MS. SHANKMAN: We would immediately look at our regulations. I mean, if we have information that the basis for our regulations and risk estimates are way out of line, what would we do?

MR. ALCOCK: What do you mean by way out of line? That's --

MS. SHANKMAN: Well, I can't speculate.

MR. ALCOCK: Okay.

MS. SHANKMAN: It's been the Commission's pattern

of operation, as long as I've been with it, is that if we think and know, have information that something is unsafe, we take immediate action. What that action would be and how we would proceed and the quality of the information, you're asking me to speculate about a lot of things.

But I've been involved in closing down plants, stopping shipments, pulling certificates, canceling quality assurance programs, all related to safety issues that we know about and we've asked for immediate actions from licensees and certificate holders to correct safety problems.

And that isn't even touching the regulations. But can I speculate what we would do if the risk estimate -- I don't know. I mean, clearly, it would be of significant concern and we would look at it and review it and take whatever immediate action we thought needed to be taken. I wouldn't do it alone.

MR. ALCOCK: Thank you.

MR. CAMERON: Okay. We're going to go to John and then to Bob Halstead. And I guess a question I have for everybody to think about, does anybody besides Bob, at this point, have a criticism of any of the findings or -- besides what we heard about general methodology, does anybody have a specific criticism of 6672 that they want to bring to our attention?

It may be that people are not very familiar with it, also. I realize that. But I'm just trying to get an idea of about how much we want to bring out on those grounds. But think about that.

John?

MR. HADDER: Probably a lot of people aren't very familiar with it because they didn't know it existed. I wanted to follow-up on a couple things, the question that Bob just asked was really -- and I was wondering if there was a specific answer to how much higher risk would initiate regulation reassessment or change.

He asked that specifically and I don't know if there is an answer for that, but are we talking a factor of two, a factor of 30 percent increase? I mean, is there any idea?

MS. SHANKMAN: Probabilistic risk assessment is not a number, as the study suggests. There are lots of numbers and there are ranges and there are bracketing numbers. So I can't answer -- you know, when you say factor of two, of course, if it was twice as risky, that would be a significant issue and we would have to do something about it.

But when you say 30 percent, of what? I think your concern that we accurately portray the risk, I think that is a very important thing to do. To speculate what

would happen if the study had come out differently, we're going to look at the issues that Bob raises and other people raise about the veracity of the study.

But you're asking me to say, okay, this is going to show me that it's 30 percent more, what will I do? First, I have to start with what the criticism is and what it shows us.

MR. CAMERON: Okay.

MR. HADDER: I'd like to follow-up.

MR. CAMERON: Go ahead, John.

MR. HADDER: That's exactly the point I've been trying to talk about, the problem with how the public perceives this, is those kind of questions don't get answered.

That's part of the problem that I think was going on here. You said 30 percent of what, that's what we keep asking. Well, what? What? What is the risk that you're talking about? What is the risk that's embedded in those regulations? What is the sense of real world changes or whatever that initiates it?

This is the miss, in my opinion. The document itself quotes a lot of numbers. I don't see error brackets on almost any of those numbers. I mean, there's probably an analysis in there of the uncertainty somewhere and I haven't looked at it in detail.

But what I'm saying, again, this communicates what do we know and what we don't know, how do we know what we know.

It was indicated earlier, and this is a question also for Bob, that talked about improving the fidelity of prediction. Prediction of what? What are we predicting here?

These are the kind of things that I think are kind of hanging out in the wind that we need to -- has to be addressed in these reports.

If we're going to use these models to predict -- risk, is that really predicting? What are we predicting? When you do an experiment, when you do work, you have the result and you try to predict what that result is going to be and then you go ahead and do the experiment to show whether your prediction works, is correct.

I guess that's the piece that I'm not seeing. That's the piece that the public is not seeing. Where is the connection between what really -- what the analysis is showing us is supposed to be the case and what really would be the case.

I don't see that. So that's more of a process issue, in a way.

MR. CAMERON: Let me let Susan try to answer that, and I guess since we're going to go to Bob next, and then

Fred, but, Bob, what would your -- I would like to ask you. What would your answer to John's concern be? And, Susan, why don't you -- you had something you wanted to say.

MS. SHANKMAN: I'd rather hear other people.

MR. HALSTEAD: Well, I think my comment and question are going to follow-up on this, but I want to comment on something that Bob Luna, who I have come to increasingly respect over the years -- you know, there was a time where every time I had a meeting with Sandia people, I had put my little tape recorder on the desk, because I wasn't sure anybody would remember what we actually said. And the fact that we now have a different sort of trust in each other I think is indicative of a lot of improvements that took place, some, ironically, funded by DOE's old defense programs, when Larry Harmon, as I understand it, provided a lot of the money that was used to make the RADTRAN code more user-friendly and also to specifically explore technical areas at stakeholders.

So now we have a RADTRAN code that allows you to generate data which has major policy implications. So, for example, you take the worst case truck accident that DOE describes in their draft EIS and using worst case assumptions or at least more severe assumptions that DOE considered, we can kind of bound that analysis and say, okay, costs between a billion and 20 billion dollars to

clean up the dispersed and deposited radionuclides.

If you leave them on the ground for 50 years, you might cause 200 latent cancer fatalities. That helps bound the public discussion of whether you're going to spend that money to prevent those cancers and certainly someone from DOE will say, yeah, but in that population, you would expect 50,000 people to die of cancer over 30 years, so the 200 additional cancers is insignificant and not worth spending the money to clean up.

But you can now use the tools that were developed under Bob's watch to address precisely the kinds of public policy questions that stakeholders have been asking, and I think that's a really good thing and I commend Bob and Seglinda and John Cashwell and a whole host of other people who have been toiling over there for 20 years.

Now, how do we relate that to this question. I don't -- I assume that this is the kind of audience that's probably read this document and I know a lot of people around the table have, but I would like to hear Ken, on behalf of Sandia, and I'm not trying to put him on the spot, if he hasn't thought about answering the question this way.

I would like to know, based on 6672, what -- I'd like to have him briefly describe the maximum severe rail accident involving a release, the maximum severe truck accident involving a release.

I'd like him to tell me what the estimated probability of each of those occurrences is. I'd like him to describe for me the population dose in person rem, number of expected latent cancer fatalities.

And I don't know if you actually use the economic cost cleanup component of RADTRAN-4 or RADTRAN-5 to do that. Tell us what the cost impacts would be.

That's a really good way of getting into this overall discussion. As I said, it has led to a great improvement in the technical debate between DOE and the State of Nevada that the Department of Energy was willing to assume the burden of proof.

We may question whether their probability factor is too high or too low by a factor of ten and whether their consequence number is too high or too low by a factor of two or a factor of 40, but it's helped focus the debate, because we want to know what drives that very low reassuring risk number that you give to the public that says, well, your annual risk of a latent cancer fatality -- and, of course, that's a difficulty in and of itself, because the way that we assess health effects is not necessarily the way that we would do it in an ideal world.

But if you could kind of give us, as a starter, what your maximum severe accident numbers are and then I think that would help fuel this discussion, and then we can

talk about the reasons why we think that consequence is too low and why that probability is too low.

MR. SORENSON: Well, you did put me on the spot a little bit, Bob. We did actually do individual dose estimates for rail shipments and for a severe accident, and this is a postulated probability of occurrence of about one in a billion chance of occurring, individual dose of between three to 500 rem, and that's what we call a cede value, c-e-d-e, which is a 50-year exposure.

Near-term exposure from that type of accident would be about 50 rem, somewhere in that vicinity, and that's the rail accident.

MR. HALSTEAD: Are you talking about maximum exposed individual?

MR. SORENSON: Individual dose. I don't know, Bob, is that --

MR. HALSTEAD: What is your page citation?

MR. SORENSON: That's 854.

MR. CAMERON: Let's use this as sort of illustrative of the problem, because I don't think we're going to be able to, as Bob pointed out earlier, get into an in-depth discussion on this. But if this example illustrates something, then let's do it.

MR. HALSTEAD: This is exactly the point. It's taken 20 years of interaction between the State of Nevada

and the Department of Energy for us to be able to have a meaningful discussion, because DOE is willing to throw their description and their number, and, of course, it's driven by the use of the accident categories in the modal study and we still have a problem with their lack of specificity in actually describing the physical phenomena that they think could result in that pathway creation, damage to the fuel, and transport of radionuclides from the accident site.

And there is another tool RISKINE developed at Argonne National Laboratories, which is kind of a good check on all of this, and we've done side-by-side RADTRAN and RISKINE runs and there will be some difference. But generally it's within a factor of two or three in estimating the consequence, and I think that's pretty good, given the different construction of the models.

But I think right here, if you can't answer that question, then there is a real problem with that study. You need to describe for me what happens in that accident, truck or rail, and tell me what you think the fractional release is; is it, as Sandquist said, a maximum of about 1,400 curies of cesium 134, 137 and cobalt-60? And if you have the worst case weather conditions for that particular analysis, is it reasonable to assume that that plume could deposit those radionuclides over a 40-square kilometer area.

I mean, we need to be at that level. You have to

demystify this process for the public. Not everybody is comfortable with those models.

So if you can't say what your worst case accident consequence is and link it to an accident, then I don't think there's any credibility in your annualized risk estimate, and that's a big burden you take, given the fact that you well know that you have both limited test data and limited benchmarking data for the codes, and really a limited understanding of phenomena like -- you know, one of the original problems in the modal study was a two percent strain on the inner cask shell and they said, gee, if that happens, the bolts fail about halfway to that, or at least that was the argument that people from British Nuclear Fuels made to us based on their study.

So I really don't think you're there unless you can answer that question with confidence.

MR. CAMERON: Okay. Let's give Ken a chance to respond to that, and then we have Fred and Bill and Kevin. Then I think we're probably going to have to go out to the audience and see if there's comments out there, and break for lunch.

Go ahead, Ken.

MR. SORENSON: Well, I certainly can't answer that question at the level of detail I think you're asking, Bob. I don't have all that data.

We can answer that, given a little bit of thought, I think, and respond in a way that I think would be satisfactory to you and we also have people in the audience who have actually worked on those calculations. Maybe we could talk off-line to let you have a sense of exactly what went into those calculations.

But I can assure you that the analysis done on this had very specific accident scenarios. It developed into a type of a consequence that led to this sort of release, and you could get, I think, a good sense for what type of consequence and accident severity led to this type of release and ultimate exposure.

MR. CAMERON: And I would also just put the question to the group. Bob was saying that the answer to this question is absolutely necessary and I just want to leave open for anybody around the table to offer another opinion about whether that's true or not, too. We may all accept that, but I want to make sure that people can respond to that.

Let's go to Fred and then Bill and then Kevin. Fred?

MR. DILGER: This is a little bit of an old answer now, but, Chip, you asked earlier if anybody else had any other problem, and the answer is yes, we do. However, because we have this problem, because we have a process

problem that's related to it, I can't give you a specific answer. We're going to file our comments when we get them prepared, but because county governments don't have mechanical engineers who have experience with finite element analysis and cask performance on staff, we've had to contract to get somebody to help us review this document, and that means that there is a substantial lead time.

I can tell you that the argument about how much money we were going to be willing to spend, again, two weeks ago, and so it's still going to have to move through our process. But here, again, this goes to the point that Bob made very early on that had we received some warning about this document, we'd be much further along and maybe able to give you some kind of -- give you better comments on specific problems we have with the study.

Let me just go on to some of the things that Bob said here, though, that demystifying the assumptions, clearly stating all the assumptions, particularly about consequences, is very, very helpful in understanding what the report is saying.

MR. CAMERON: Thanks for that, Fred. I'll leave it to the NRC to think about how they might incorporate that type of excellent input into not this study in terms of this document, but in terms of what the analysis and findings that are into that document.

I think that's an issue that's squarely being put on the table for NRC consideration.

Bill?

MR. OTT: Let me take this down to a little bit more probably mundane level. One of the things I have to do in talking with the people that live in the area where I live, which are kind of miners, ranchers, sage brush farmers, people like that, is take information like Ken just put up in there in a slide and kind of pass it on to them and give them some opinion of what this all means.

I look at this accident risk result. What I see here for a highway accident is a person rem dose rate, I assume, resulting from a particular type of accident. So we'd all have to agree it's kind of negligible.

So I guess the question I have, in my mind, and kind of what prompted this is when I was driving down here last night, I drove by a wrecking yard in Ely and there was what at one point in time was a semi tractor-trailer sitting on the back of a flatbed truck. The wreckage of it kind of looked like something out of the Value Jet or Air Florida accident, and you couldn't really identify anything of it, including the engine.

Given that things like that do happen, back to Bob's point about unique local conditions in Nevada and, in particular, where I live, that particular wreck occurred up

in a place called Mary's Summit, which is kind of characterized by very high winds most of the time, high winds that blow mostly down into the City of Ely, five, six thousand people, maybe not a lot of people if you're from the Northeast, but if you live in Ely, it seems like a lot of people.

Ely's water supply originates in Murray Canyon. So you have all these kind of interesting local conditions there. And I look at this number, so is this a number I should take back to the people that live in White Pine County and particularly that live in Ely and say you shouldn't worry about this, that the NRC, in their role of promoting public safety, has got this bounded, they understand our conditions, they understand what can happen, what cannot happen, what the probability of these type of things happening.

Again, these are really -- you know, sage brush farmers really don't know too much about linear probabilistic analysis.

In other words, we shouldn't worry. And somehow I feel a little bit uneasy taking that piece of information back. I mean, this is such a firm number, ten-to-the-eight times to, what, ten-to-the-minus-seventh, ten-to-the-minus-eighth.

No bounds on it, no uncertainty, here's a number,

and any reasonable person would conclude not to worry. That even though we may be involuntary recipients of this shipping campaign of spent nuclear fuel, that there really is no appreciable risk to the residents of White Pine County, and, again, I feel very kind of reticent to draw that conclusion, but I'm not sure, based on what I don't know, as to why I shouldn't draw that conclusion.

So I guess to some extent, it really comes back to the question, then I'll shut up. Are you really this confident, given the local conditions, for example, in White Pine County, that everybody who lives in White Pine County, who never asked for this stuff to be shipped through here in the first place, shouldn't worry at all about any kind of significant exposure, radiological exposure resulting from the shipping campaign?

Because pretty much that's what this slide tells me and, unfortunately, this is the same thing that happened in the DEIS and other things I have seen. It all sort of somehow gets distilled down to something like this and this is about as much as I can expect most people in White Pine County to understand.

MR. CAMERON: How do we -- that's a real bottom line question. How do we respond to someone who is in Bill's position in terms of telling his constituents what the bottom line is here?

MR. OTT: Because that's really what it comes down to.

MR. SORENSON: Well, I think it's an excellent point and it's something that we have grappled with in terms of how to communicate this idea of risk and a quantification of risk.

MR. OTT: Unfortunately, you quantify the risk down to a single discreet number.

MR. SORENSON: Well, there are bounds of uncertainty, to answer John's point, as well, in the report, there are. We did not put them here and, again, that's a communication issue.

MR. OTT: When we have public meetings and stuff, this is what people tend to see. They don't see a 400-page report. It requires a fairly substantial technical education to even get through the executive summary on it.

MR. SORENSON: So there must be better ways to communicate risk and that's something that we continually work on. We will probably change these slides for the September 13 meeting in Washington, D.C., when we give this talk.

But I think your question in terms of should you worry, based on these conclusions, that's kind of a societal value judgment, I think, that each individual has to decide for themselves.

I can tell you, personally, that I would not worry about that.

MR. OTT: Frankly, that's what I'm looking for. Since I'm not capable of determining this myself, we kind of have to depend on folks like you, whether we like it or not, hopefully with some independent review, because we're not capable of determining these things ourselves. We're not really capable of discerning beyond the discreet number there, whether this is a good number, bad number, what it really means.

MR. SORENSON: Another point is that I have witnessed many severe accident simulations, tests, both drop tests and fire tests, where the casks have actually gone under very severe loadings, and it's truly amazing how robust these casks are and how truly safe they are.

And given that, with the very low probabilities that such a severe accident could happen, I could say with confidence that you shouldn't worry. But whether that holds any water for you, I just can't answer that.

MR. OTT: Just to tie this off, when I see an engine block of Caterpillar diesel that's in about 20 pieces, how can I somehow translate this into a cylindrical shipping cask that's mostly hollow.

All I'm saying is sometimes empirical data, observations, real world experience doesn't always

necessarily translate into the type of analysis that you do. It tends to become somewhat diffuse.

MR. CAMERON: And I guess the other point of your question, too, is how comfortable can your constituents be that the type of local conditions that you were describing --

MR. OTT: Are incorporated in the analysis.

MR. CAMERON: Yes. Are they bounded by the analysis?

MR. OTT: We define segments. The DOE, I think, in their EIS, defines segments several hundred miles long. For example, on U.S. 93-6, you actually probably never even looked at it because it's not one of the recommended routes, but if you did, what kind of segment analysis would you do, would you do a one-kilometer segment analysis, would you -- you know, what would you do?

And actually the ones that have been done have been 23 mile segment analysis through there, but that really doesn't give you the right results.

MR. CAMERON: I think Susan wanted to say something in response to Bill, and we have Kevin and Steve Kraft and Bob Halstead, and then we really need to go to the audience and then close up.

So, Susan, if you could respond and then we'll go to Kevin and then Steve and then Bob Halstead. Go ahead.

MS. SHANKMAN: I think your point is very well taken. There is initiating conditions that you see all the time and the wrecked Caterpillar truck, if that's what you were talking about, is an initiating condition, and it's what happened to the truck.

And what we're looking at is what would happen to the cask.

MR. OTT: What does it take to do that to, in effect, a solid piece of steel.

MS. SHANKMAN: Right. And that's what the structural analysis in 6672 did and what we're going to look at in the package performance study. And I can't speak to that particular truck, but we look at known accidents and data from known accidents and the Department of Transportation Volpe Center was very much involved in this, and the Volpe Center is their research arm that has data.

I believe, Kevin, you can correct me, they have data on accident rates for every mile of track in the country, according to --

MR. BLACKWELL: There is a bounding limit.

MS. SHANKMAN: Right. Okay. That's why I asked you to correct me. And they also have highway accident rates and where you're likely to have initiating conditions, overpasses, crossings, what are the factors that you should look at.

And they were involved with Sandia in looking at how those routes were selected and what factors.

So were the factors in your particular route incorporated? No, I think they were bounded, and that's the problem with risk analysis. The Commission has directed all of us to look at risk-informing our regulations. You first have to have a solid basis of what that risk entails and 6672, I think, takes us a long way towards that.

Is it perfect? No. I'm not going to tell you that that study is exactly everything you would ever want to know. But does it bound it in a way that goes back to the initial Commission decision that transportation was safe? Yes.

MR. CAMERON: Let's go to Kevin, then Steve, then finish up with Bob, before we go to the audience. Kevin?

MR. BLACKWELL: I'll be fairly short and brief, since everybody's very hungry and wants to get lunch, I'm sure.

I will admit that I have not read the report. It's next on my list to read, because I'm really looking forward to it.

But I have a couple quick questions here. One is that, one, since we're talking about risk assessment on 6672, was any consideration given to what is actually being done out there from the inspection safety standpoint, as to

how that affects risk in regards to these shipments?

Obviously, there is a lot of work being done. There's things not just at the Federal level, but at the state level, where the equipment and everything is being looked at to a frequency level higher than routine hazardous material transportation shipments of other kinds. These shipments move right now and everything is being looked at from top to bottom, stem to stern. Track is being looked at that are on the route.

This is not something done for every shipment. And my question is was any consideration given to those kind of real time operational things that are being done specific to the movement of spent nuclear fuel as to how that affects the risk positively or negatively either way?

That's just a question as to whether it was even considered.

MR. SORENSON: We did look at operational aspects for incident-free and also inspection sorts of situations, as well. In terms of incidence-free, looking at the stock model, if you will, for how long a driver has to stop and rest and eat and that sort of thing, as well as inspections.

MR. BLACKWELL: It kind of went to even one of Bob's comments on his note here about human errors. There's a lot of work being done in the rail industry about fatigue and that kind of thing, and it's not tied to the transport

of spent nuclear fuel. It's tied to the operating environment of the railroad as a whole. So there's a lot of things being done in that area.

MR. SORENSON: Actually, that is a comment for the issues report and the package performance study, to look at that quantitatively.

MR. CAMERON: I think we'll get more into that this afternoon. Let's go to Steve Kraft, and then we'll finish up with Bob Halstead, and then go out to all of you out here.

MR. KRAFT: Thanks, Chip. A recurring theme through a lot of the discussion, while it was all in -- the only thing Bob left out was ten-to-the-minus whatever in his discussion, and I'd be curious to know what the probability levels are for those other conditions that they describe in their analysis.

But I think a lot of the discussion, particularly Bill Ott's discussion, really gets to a concern that we have that permeates a lot of the documentation that we've read so far, and it's along the line of public confidence.

The classic story is the engineer stands up in front of an angered and enraged local community about some project, it doesn't have to be nuclear, about some project they're going to build, an incinerator, a prison, whatever, and they just about run this person out of town on a rail,

forgive the pun.

And the engineer thinks, gee, all I got to do is go back to my desk and write a better viewgraph show and I'll convince them. And I don't think that's right.

And the question I would ask, and I would ask NRC and its contractors to ponder, is that the documentation -- and everyone to ponder. There's a lot of assertions being made about the public would be more confident if, and fill in the blank.

How do you know what? What are you doing to identify that? And from that, then how do you take that next step, if, for example, the Department of Energy is interested in pursuing the program -- to know what really makes the public tick on these issues, then go back to the public and how do you answer the questions, Bill, who seems to be, of everyone in the room, on the front line with the public, the real public, and answer those questions.

And it's not a matter of acceptance. I think everyone is right. It's a matter of confidence. And whether Bob's right in terms of you have to know -- you have to be able to explain to a miner in White Pine County, down to the ten-to-the-minus-X factor, what happens in that particular piece of road, is that right? I suspect it's not, but perhaps it is.

I don't think we know. I don't think NRC knows.

I don't think its contractors know. I think the documentation I've read about future testing as a way to increase -- or future activities, whether it's testing or finite element analysis, actually to increase public confidence are assertions and they are not actually understood as to what it is that really makes the public tick on these, and I think that's really the issue of what the last ten or 15 minutes has been.

MR. CAMERON: Thank you, Steve. I think that's sort of an underlying question that we need to keep in mind all during today's discussion and the public meeting tonight.

I think Judy and John have given us a couple examples at least of what they think the public needs to know to have confidence, and you are wondering whether that's, in other words, full scale testing, whether that's true or not.

I think that when we get to the issues study, Sandia issues study, this afternoon, we may be able to put a finer point on that, because that's a key issue.

Let's finish off up here with Bob and then go out here. Go ahead, Bob.

MR. HALSTEAD: I want to get back to why it's necessary, in our opinion, to do these very detailed consequence assessments. But before I do that, I want to

say, I really agree with Steve that we don't know enough about what it takes to enhance public confidence, although there is some polling data that Hank Jenkins-Smith has done and some other people have done in New Mexico and places, that shows people do respond to certain extra regulatory safety precautions, like driver and carrier selection programs, frequent inspection programs.

But on the later ticket items, like cask testing, we really don't know. So that's an area I would say we need some.

Now, back to why it's important to actually quantify these severe accident consequences and probabilities, it's been important for us in the State of Nevada because it's helped us critique our own position on transportation safety generally, by, on the one hand, suggesting to us that we may have put too much emphasis on accident risk.

That's not to say accidents aren't important, and I won't lay all the numbers out again. I think one of the things we've also found in that is that in the worst case accident, it's the horrific cleanup costs rather than the health effects we probably have to struggle with, and then there will be a big public policy issue over how Price Andersen is applied and, in fact, whether money is spent to clean up an area or we simply quarantine it and say see you

in 50 years, because that ground shine is something we don't want to deal with, but it's too expensive to clean it up.

Conversely, as we have done more specific analysis of these consequences and probabilities, we have come to realize that we've probably underestimated other types of catastrophic events, and I won't get into it in detail, because we're, as you know, petitioning the Commission to look at the terrorism sabotage issue, which, in terms of both health effects and dollar costs, probably is arguably a greater concern than accidents.

And on the other end of the spectrum, we have been very influenced by work that Ruth Wymer and others have done calling our attention to the fact that we haven't paid enough attention to the fact that we haven't paid enough attention probably to routine radiological exposures.

On the one hand, in the case of safety workers, like truck inspectors, doing a North American Enhanced Standards inspection pretty quickly rack up a potentially significant cumulative dose if they only inspect one truck a week, 50 weeks a year.

Also, where we have situations along unusual routes, the ones that Bill talked about. Now, in Bill's city, in Ely, there is a traffic signal with a left-hand turn, where U.S. 93 connects -- it actually turns south towards DePea Ocean, then it connects with U.S. 6, and then

there's a right-hand turn there where there will probably be a traffic signal, if it isn't already built, and I've timed trucks making their left-hand turns and their right-hand turns.

It takes, on average, about 90 seconds for a truck to clear that intersection. Now, you figure the regulatory exposure rate, maybe, in reality, it's seven, eight or nine millirem per hour instead the ten the regulations allow, but let's say you get 1,200 trucks a year through there, which would be about half of what would happen under the worst case truck scenario, and you get a 90-second stop time and you calculate what the hot spot exposure that's created around that intersection is.

Now, you'd have to be only six, seven feet away from the cask to get the full dose, but you very quickly, in these unique local condition situations, get cumulative exposures potentially as high, just from routine operation, as 300 millirem. That's almost a doubling of the background dose.

Now, statistically, someone will tell you, okay, that gives you a 0.7 percent increase in your cancer risk, if you believe the Bier numbers. On the other hand, there are other interpretations in the health community, the so-called no linear threshold assumption says maybe you can't be sure that the increase in your cancer risk is low.

Similarly, when you get down the road to Tonapah, in Nye County, where U.S. 6 would come in from an intermodal transfer facility in Caliente, and, particularly, if you have heavy haul trucks, that's going to take them more than 90 seconds, if indeed it's physically possible for them to clear that intersection as it now is constructed, and you're talking about routine exposures there equal to what I said in Ely.

But you have a regional hospital right there at that corner. So when you start looking at these unique local conditions, and I'm not saying that should necessarily be addressed in a generic study, okay. I'm saying don't come into Nevada and tell us that this generic study is going to take the place of a route-specific analysis, the kind we expect DOE to do in the EIS and we've documented this for them.

But the whole point in all this is, for us, we think there has been some value in looking at these different types of risks and what it's said to us is accident risk is important, but it's probably not as important as we thought ten years ago.

Sabotage terrorism risk is real important and we're trying to figure out what's the best way to handle that, and, for sure, the thing that we thought wasn't such a big deal, which was routine exposures, we now realize we

didn't pay enough attention to and we need to look at that.

And in each case, there are a number of mitigation strategies through administrative controls that can be used to deal with those consequences. So it's not like this is some hopeless situation.

But until you do this type of analysis, you can't direct your own energy in the areas that are most necessary to protect the public health and the environment, and that's why we think this kind of detailed explanation of what's behind the aggregate numbers is important, because it actually does affect the way that, in the end, elected political leaders have to make policy decisions on how to spend scarce resources.

MR. CAMERON: Thanks, Bob. I think we'll perhaps touch on routine exposures again today. I was remiss in not having the newest member of our panel introduce himself. Steve, would you like to do that right now? I think most people know you, but for the record.

MR. KRAFT: Sure, Chip. Steve Kraft, Director of Spent Nuclear Fuel Management from the Nuclear Energy Institute.

MR. CAMERON: Thank you. We will have a list for you when you come back from lunch and I'm sorry that we didn't have it available earlier.

Let's go out to the audience. Dr. Paz?

MR. PAZ: I have to make a comment. Number one, the manner in which you use the probabilistic model for assessment of risk, in my scientific opinion, is inaccurate.

You have here a situation, in the worst accident, releasing of toxic heavy metals, probably, we're not sure, the neutron poisoning, including lanthanide, highly toxic, around ten-to-the-minus-six, smaller. Then we have the issue of radionuclides.

How are you going to address that, per se, in the real world, you don't take and observe one radionuclide, rather, but mixtures.

I think you should address in your method and characterize the risk based upon physiological-based pharmakenetic models. There is now almost no work has been done in the literature, which I extensively survey it.

Second is, does the NRC can take a fresh look and sponsor research which enables to give you a good definition what is the risk, how we define cancer risk, how we define non-cancer risk, because with the traditional model, you have an erroneous error.

Thank you.

MR. CAMERON: Thank you, Dr. Paz. Any response at this point? Did the NRC understand the two points that Dr. Paz raised? Okay. Thank you, Dr. Paz.

We're going to go over here to Steve Frishman.

Steve?

MR. FRISHMAN: Susan, you started out by talking about trying to keep from using acronyms or sort of the code words of the business. It occurred to me, listening to the conversation, that, first of all, in even simpler terms than it's been stated, the reason that this NUREG is there is because the Commission needs to reassure itself that Part 71 is risk-informed.

I think that's what it is. It was stated slightly differently, but --

MS. SHANKMAN: Not all of Part 71. It only looked at spent fuel transportation. Part 71 covers all transportation of radioactive material.

MR. FRISHMAN: Okay. I'm talking shorthand now. And I think the word "risk" is shorthand in terms of where we hit the rub between what the public's expectations are and what the regulators and the policy-makers' expectations are.

It seems to me, from having talked and been with a lot of people who are very concerned about transportation, they want to be consequence and probability informed and risk is a shorthand for that.

So maybe it's at that simple demarcation of sophistication that there is a place to look. But, also, I think what's germane to this discussion, and Halstead

brought it up, and that's that if this NUREG does not make clear that you can assure yourself that you are consequence and probability informed about the result of this report, then maybe the report needs to be -- or the NUREG needs to be looked at again in terms of what Halstead was asking about, can you easily define the scenario that resulted in the risk calculation, and it sounds as if you can't do that very well.

Maybe the NUREG needs to be looked at in terms of does it do its job right and that seems to me a question that's still sort of floating out there.

MS. SHANKMAN: I agree.

MR. CAMERON: Thank you, Steve.

MS. SHANKMAN: I agree with the comment. I agree with you that it should do its job. I did want to make the point that the better we can communicate consequence and probability and understand that it's risk, and I think that it's hard to be a disinterested party if the route is close to your home.

And since the rail route and the highway route are -- one is within 100 feet of my house and the other is within a quarter of a mile, I'm not a disinterested party in this whole discussion. So I agree with you, it should do a better job, if it doesn't do it.

But I need information on how it doesn't do it at

this point.

MR. CAMERON: Okay. Thank you all very much. I did want to make two short announcements before we break for lunch. There is going to be another roundtable meeting like this in Washington, D.C. on this subject on September 13th, and, also, the Advisory Committee on Nuclear Waste is meeting out here at the Crown Plaza Hotel in Las Vegas on September 19th and 20th.

And if you need more information on that, one of the ACNW staffers, Jit, right back here, you can talk to him about that.

So let's take a -- let's be back at 1:15. That gives you a little bit over an hour, and then we'll get into the brochure on this subject.

[Whereupon, at 12:15 p.m., the meeting was recessed, to reconvene this same day at 1:15 p.m.]

AFTERNOON SESSION

[1:30 p.m.]

MR. CAMERON: Welcome back from lunch. We have one issue remaining in regard to NUREG-6672, and that's a brochure, at least we're calling it a brochure. I don't know what the correct name is. Maybe that's the correct name.

But this is a description of spent fuel transportation risk for the public and John Cook from the NRC staff is going to talk about it a little bit, but what we would like to get some input from all of you on is -- and suspend disbelief a little bit, too, because we did have a discussion this morning about how 6672 might need some -- might benefit from some further explication or vetting, there were some views on that, obviously.

So what we're looking for here on the brochure is how clear is it, does it get the message, clear message about transportation risk to the public, and I guess that some of the comments we heard this morning are fair game, too; Bill Ott's comment about someone from the public reading this, what does this tell me in terms of public confidence or being comfortable with it.

I'm going to turn it over to John now. We had a half-hour scheduled for this and we're going to do some more this afternoon in terms of these breakout sessions.

So I don't know if we have a half-hour's wroth of discussion at this point on it, but let's see where we go with it. John?

MR. COOK: Thanks. And we're talking about the discussion paper that's in the back of the mail-out that went to you.

AS I mentioned this morning, this discussion paper was included for the benefit of the participants here, who we assumed had at least seem some, if not all this sort of material before.

And it was our attempt to reduce the 515-page, two volume complete report down to something that would be hopefully more manageable and more understandable.

Our thought is to make one more reduction, to go from this 25-page discussion paper to a brochure that may only be half this size, that being for public consumption.

I think what we're trying to assume there is that the participants picking up that brochure would have no particular experience with radioactive materials or risks in general, really would need to be brought up from an assumption of not much familiarity to being able to understand what the benefit of this study was. So clearly this is a challenge.

I think the questions that we faced even in doing the discussion paper and we'd certainly face more so in

doing a brochure, would be how much material to include and at what depth.

So I think that's what we're looking for, some discussion or input or maybe just your thoughts on what we might try to do to improve upon what we have here. Maybe as a couple of specific points, in looking through the brochure, for example, on page 16, we have -- the discussion paper -- we have an attempt at trying to portray our event trees.

Would there be any comment as to whether that appears to be perhaps too difficult to be able to uptake readily? Then perhaps as a final question, two pages later, we have a sample of a very severe accident sequence, and this may not answer all of the input we heard this morning about trying to provide both the probability and the consequence of accidents, but at least it may be a step in that direction, if you so believe.

So with that kind of brief introduction, I would turn this back to Chip.

MR. CAMERON: Okay. Thanks, John. Does anybody want to start us off with this? Bill?

MR. OTT: Sure. This is sort of back to the sage brush farmer analogy. I've kind of been looking through this. Actually, this is not too bad of a document, but something -- I don't know exactly how to tell you how to

proceed on this, but just as an idea.

People who aren't -- don't have advanced degrees in technical disciplines and stuff, which is most people, tend to get a little put off by a lot of jargon and those kind of numbers and those kinds of things.

At least in my experience, what's a little bit easier for them to relate to is kind of real world empirical kinds of experiences, and let me give you an example of where I think you can get in trouble with this document.

You talk about impact tests. Something about --

MS. SHANKMAN: What page are you on?

MR. OTT: I think it's on page 10, basically you're talking about an impact equivalent to a 30 mile per hour impact. Now, if you go up to sage brush farmer country, you'd be basically showing this to people who routinely drive down U.S. 93 at 75 miles an hour and are passed up by gas tankers.

So if you try to convince them that obviously this is safe at 30 miles an hour, when they see trucks going by them doing 85 miles an hour, you lost them, and you may kind of laugh at that, but that's kind of the level at which people deal with these kind of things.

Again, they don't really understand a lot of the analysis behind it and can't be expected to.

So what I kind of suggest is when you have

examples, when you have parameters like this, and this really comes back to your testing program, which maybe we'll get into a little bit later, you really have to try to convince people in terms that they can understand that you have actually demonstrably tested this, because people have -- especially if their downwinders, have somewhat of a mistrust of analytical approaches. That you've actually tested this in real world conditions that they're familiar with and if you haven't done that, you can spend all the money you want, you can have extremely qualified people doing the analysis, won't mean a thing. You'll lose them when you have stuff like this.

MR. CAMERON: Thank you, again. I think you made two points. One was a presentation point about the examples should have some context in reality, but you also made a point about the underlying substance of the report.

MR. OTT: Actually, you've worded it much better than I have, context in reality, and we're talking about the average person's reality, it's very important here. Something they can relate to.

MR. CAMERON: Good. Thank you. Let's go to Abby.

MS. JOHNSON: Abby Johnson, Eureka County. I'd add to what Bill just said. In this respect, I sort of feel like Bill and I and the other county people here are the ones -- are your guinea pigs in that, oh, let's give them

this information and see how they explain it to their citizens.

And one of the things, the reason I wasn't at the last meeting in December was because I was listening to all those citizens who were reacting to the Department of Energy's environmental impact statement.

And one of the problems that we have is taking a national study that spreads the peanut butter evenly on the piece of bread and then looks at the little chunk and says, oh, well, whether you live in Montana or Maine or south of Florida or North Dakota, you're all the same, and then we come to Nevada, where I call it the funnel tunnel syndrome, all the shipments coming to Nevada, and then you're saying, well, take this information and go tell them it's safe, and they say, yeah, but we're going to get all the shipments.

The people that live in Maine, they're only getting maybe 30, and it's only once they ship from Wiskasset and that's done, that's done. They're never going to see another shipment.

So my understanding of risk analysis is limited and not Ph.D. professional or anything, just common sense. But that is some feedback of how people react to that kind of information.

And since I have to leave at three and since I don't know the next time I'll be so moved as to use the

microphone, I'll just keep going for a couple more minutes, if that's okay.

MR. CAMERON: Go ahead.

MS. JOHNSON: One thing in your talk, you mentioned that in the 1070 study, that there were three million radioactive shipments considered in 1977, and then I found in here that now there's between three million and four million a year. But then of those three million to four million a year, most of those are the FedEx, slap the magnetic thing on the side kind of shipments.

So all this information, we take all this information that's based on risks of three million to four million shipments, only a really, really tiny portion of those are actually the ones we're concerned about, the spent fuel ones.

And then we say accept this number that's based on the past so that you will trust us for this really, really big increase in relation to what's happened in the past of future shipments, and then we throw up our hands and say why doesn't the public understand.

Well, there's a lot of trust involved in saying, well, we're going to do this study now based on the past, but then we're going to do it in the future, based on the past, where there really, frankly, if it was the Census, you'd probably be suppressing the data, so you wouldn't be

disclosing the incomes of the people in the community. There's so little information. Not that I'm complaining. So that's one point.

The other point, and I don't understand why it's not addressed and maybe this is for the next part of the discussion, I can't figure out how to divide this discussion up. There's only -- there's no discussion of impacts from an accident involving a truck or train and an airplane.

In Nevada, 40 percent of our airspace is controlled by the Federal Government. It's not a ridiculous concept that a plane and a truck or train could run into each other with disastrous consequences.

Now, if those are less than a truck going at 30 miles into a bridge abutment and falling down, then you need to say that and you need to say you've considered it and it's less probable and less harmful.

But if you're not -- from my point of view, if you're not talking our language, you're not going to be able to communicate with us, and our language is getting buzzed by top gun pilots who are taking it out for a spin and because they're top gun, they're still practicing.

And the other thing I don't get is there's a lot of language in here about how the package performance study is going to look at elements which are being addressed in the 6672, and then Susan said, well, when the package

performance study is done, we'll go back and re-update or consider those elements, now that we've learned.

But just from my point of view, it's like you're putting the cart before the horse. If the package performance study is going to tell you stuff that you're going to need in order to do the risk assessment, then why don't you do that first and then do the risk assessment, instead of drawing conclusions prematurely?

And I think that's it. That's it. Thank you.

MR. CAMERON: Thanks, Abby. Useful points. Susan or John, on Abby's last point, in terms of the chicken-egg -- or maybe that's the wrong metaphor to use, I don't know, but what is it?

MR. COOK: Horse and cart.

MR. CAMERON: Okay. We have horse and cart. Do we have something else? Thanks, John. Did you understand that and does that make sense to you?

MR. COOK: I think I do understand your point. Once the package performance study is completed, that would be an opportunity to see whether there have been any changes in the packaging assessments that would indicate that it's time to take a look at risks again, and if that is what is the result of the packaging performance study, then I think we would do as you're suggesting and take a look at risks again at that point, pending the outcome of the package

performance study.

So I think it is a little confusing to hear about 6672, which looks at risks, and then we're going to look at packaging and then actually it comes back around once again to risks, pending the outcome of the packaging performance study.

Does that help?

MS. SHANKMAN: Just to add that the package performance study basically is looking at severe accidents and although accident data were considered in NUREG-6672, now we're considering some physical testing. So we may get more information than we had.

We used the best information we had to make a risk estimate for both accident-free and within the regulation risks. Now we're going to severe accidents and the last time we looked at that was 1987.

So the first one was to update work that we basically did in 1977 with some work in 1987. Now we're going back and looking at the severe accident stuff that was done in 1987.

So it's just there are different pieces of it and we just keep looking at the pieces as we have the money and the time to do it. We chose to look at the regulatory risks first before we looked at severe accidents, which are actually beyond the regulation.

So does that help explain it? Okay.

MR. CAMERON: I guess that point was still well taken, though. It may have explained it. All right. Let's go to Kevin and then to Judy and then to Steve.

MR. BLACKWELL: Real quick, my comment. I assume what you're talking about here, if I understand it, is how to take this 25-page and maybe get it down to a brochure. My comment goes to format, in that sense.

It's going to be a daunting task, because you first have to identify your target audience and then you have to decide to what -- how -- what lowest common denominator you're going to go down to in taking this information.

Basically, I think I can probably sum it up by saying you have to maintain a clear language mentality. Stay away from technical terms. If you're going to have technical terms, you're going to have to define them.

You can't just use them in the body and have the definitions up front. I know if my wife picked up one of these, she wouldn't know what a person rem was if it hit her in the trunk of the car.

So that's the kind of thing I was getting to about format. You might also want to look at what may already be out there in terms of -- some of the information in here that's already out there in brochure form. You talk about

the packaging, what is it, well, I know that DOE has brochures out that already deal with that.

So you may not have to have that kind of information in your brochure for this 25-page discussion draft. It may already exist.

MR. CAMERON: Okay. Thanks, Kevin. Bob, do you have a related point to what Kevin said?

MR. ALCOCK: Yes. I didn't want to break into the order here, though.

MR. CAMERON: Go ahead, that's fine.

MR. ALCOCK: I think the points that Kevin and Bill made are excellent ones. I think you ought to -- you have -- you're trying to cover too much here in this 25 pages and you may want to break it down into a series of brochures, or think about that, because just the subject of the transportation package and how it behaves and how it's tested can be one by itself.

For instance, the notion of what an unyielding surface is needs to be explained in a way people understand that concept, because dropping something 30 feet is nothing, that's no test. Until you understand what an unyielding surface is, you see.

And that takes some space and, therefore, it would add to the number of pages here, rather than detracting. So that's why I think you ought to break -- think about

breaking those down.

The point that Bill made I want to reinforce. People bring to these sources of information, whether it's a web site or brochure, whatever it is, what they know. They know about accidents on their road, they know about the consequences of floods that they have seen in their valley, they know -- so you have to relate all of these concepts to what people experience and there's a way to do that, and I don't want to go into it here.

But the point is that for every concept that you're writing about, you have to ask yourself am I relating this in a way that people who read this, bringing the information that they know about what happens in the world, that they will understand this information.

And I would -- my last thing is that I would encourage you to use pictures rather than diagrams and that sort of thing. I'm sure the industry can help you here in finding a picture of a cask that is open and then you can impose upon that picture, a three-dimensional thing, some boxes with some arrows, well, here's the wall of the cask and here's -- you know, because that will make it more interesting.

This looks like -- it doesn't look 21st Century to me in its presentation and I think real pictures of real objects will help it a lot.

MR. CAMERON: Okay. Thanks, Bob. Let's go to Judy.

MS. TREICHEL: Well, one of the problems I see with this thing, especially because it's written by the NRC and it's the same kind of a deal that I saw with other, the DEIS at Goshute and so forth.

This is a sales pitch. Why would NRC, who is the cop, the regulator, the person in charge of our safety, be putting in so much about doses would be even smaller and the risk of the accident is even smaller than, and result, average doses are virtually undetectable.

Why would you be pitching nuc waste transportation? You're supposed to be regulating. You're supposed to be the tough cop, and when people see that there was a study done in 1977 and now in the year 2000 it's gotten that much safer, they'll laugh you out of the water.

As we were talking about insurance rates have gone way up. Why? Because you've got so much more traffic, people drive faster, you got road rage, you got all kinds of stuff, but traveling down the road these days is not as safe, easy or whatever as it used to be 23 years ago.

So you're not going to sell anybody that transportation got safer. And when you have these tables that shows this very severe accident, dose consequence of the accident, zero, zero, zero, zero, zero, they don't

believe that.

In my file, I have a file and it's growing fairly fast and it's actually real humorous to read, and it's called "things that can't happen." And there's some marvelous examples of stuff that could never have happened, and people know that.

So their first deal is about if you say there is no consequence with a dose, the first automatic is, well, yeah, but what if there is. And your kid would say that.

So answer the question. What if there is? What if this much gets out of that cask? What does it do? What if that cask splits in this way, what does it do? I don't care if the vendor told you it can't do it, you're the tough cop. Don't try to sell somebody with this.

And in the -- I don't know. In the conversation that went on before about getting public confidence, that's probably a non-starter. If people can't have informed consent, if they're not allowed to say no, if that's off the board, then it doesn't mean anything to say yes. It's sort of like one of those confessions they get out of foreign hostages, it really is pretty meaningless.

So you can do way better than this and you can have more honest information. I don't know that you're ever going to get Nevada to stand up and scream bring it on, because I don't think you'll get any other state to do that

either.

MR. CAMERON: Judy, let me ask you a question on that, or ask the other people around the table, on the first point about the example of not having -- it looks like the NRC is pitching, selling, by -- and the example you gave is by citing examples that there wouldn't be any release from such and such a thing.

Is it a question -- now, that may be information that the public would be interested in, is a case of how it's being presented rather than having that information in there somewhere.

MS. TREICHEL: I think it just needs to be more factual and more to the point. If a cask let loose this much stuff, the data tell us and the science tells us this would be the implication.

Not to try and say don't worry, it can't hardly happen, and if it does, it's even less risky than we thought.

MR. CAMERON: So in other words, instead of just completely ignoring consequences because of the statement that, well, there would never be a release, to also deal with -- it would be more realistic to people if there were information in there about worst case, what if there were a release from it.

MS. TREICHEL: Sure. And it's possible. I've got

a file, it will tell you it's possible.

MR. CAMERON: Let's go to Steve Kraft.

MR. KRAFT: I think that Judy put her finger on the point I was trying to make earlier about the engineer faced with the angry audience. I actually think, in this case, NRC is going about this in -- they're attacking it the wrong way or whatever.

First, in answer to the representatives who are on the front line with the public, Abby, Bill, I suggest that NRC is the wrong agency that you're complaining to about the local conditions. I think that's a DOE question. And the reason I think that, that these are not Yucca Mountain or Goshute specific regulations. They are transportation regulations.

And then a regulatee uses them to transport and then they have an obligation, as they are doing in the local routing studies, to apply -- and, Bill, if there's a -- I mean, this is -- I think you raised an excellent point before lunch. If there's a situation in your community that makes that one stretch of road far riskier than the generic regulation implies it ought to be, then that's a local condition that you have a -- I think the state has the right, under DOT rules, to say you can't use that road.

So there are ways that these things can get worked out. Listen, I'm not defending DOE and they're not here to

answer the question, but I really think the demands that you're making on NRC are valid, but they're valid on DOE, not on NRC.

And the thing that Judy is pointing out here is, and I think she's -- you're not trying to sell nuclear transportation. I don't think you are. You're trying to sell the answer to the question you gave me last year, whenever we had the first meeting, about the safety.

If transporters conduct their business in accordance with your regulations, then, in your view, as the national regulator, it is a safe activity, that's what they're selling. They're not selling nuclear transportation. They're selling that what they're doing creates a safe environment to carry out that activity and they do that through these obscure technical ways of coming up with .000001 kind of numbers.

And the brochure needs to be doing that and I think if the brochure did that, there's less question as to what it is you're actually trying to accomplish, and there are many people in the business now of telling you how best to communicate to the public on risk and how to prepare the -- what the brochures are to look like, and I'm sure you'll take advantage of those folks and work that out.

And the last thing I wanted to say, and the second point that Judy made is that if somewhere along the line NRC

is going to or DOE is going to say, okay, what .00, what all that means is that the chances of the accident are so small, they're smaller than this red box, they're less than being hit by a meteorite standing on the same location, that kind of stuff.

But then you say, well, okay, but say the what if, say, well, if it did break open, here is what happens. Along with that, they have to say, wouldn't you agree, that if they did break -- if that did happen, that is based upon these numbers that are obscure and not terribly well understood by the public, to say if it did happen, it happens with a frequency far less than these other risks that are also non-voluntary that are out there as well.

The one I think of is on our comments on the EIS for the Yucca Mountain, DOE and Transportation went to ten-to-the-minus-seventh to find an accident that made some sense.

Well, you get hit by a meteorite in this room with a greater probability than ten-to-the-minus-seventh, and that's the -- I'm not saying that's wrong or right. I'm saying that that's the kind of comparison that you give people that Bill and Abby have to deal with that I think would give them some understanding and help them in their job to communicate where they can relate it to the kinds of risks that people see every day in their community.

So I think everyone is saying the same thing and I really think if you sort of change the focus of the brochure to what it is NRC actually does for the nation, that's what it is you ought to be talking about, and then it's the user of that or the regulatee's job to then take it and apply it elsewhere.

MS. TREICHEL: This thing doesn't have the regulation anywhere in it, does it? I mean, in this brochure part, does it tell what these things have to comply with?

MR. KRAFT: Well, they do in that impacts part, which is another issue. I mean, if they're going -- we haven't talked about the physical testing part yet, but if you're going to do that, let's leap ahead a couple hours and say, okay, you're going to do that.

So the way you deal with this issue and the 30 mile an hour thing that Bill talked about -- my mother-in-law is really, really smart. Why she let her daughter marry me is another question. But having said that, I take things like this and say do me a favor and read this and what do you think. And she has not read this one, but things like this, and she's a college-educated woman, and her eyes start to spin, what is this.

So yes, I think that's a good way to look at that and everything else is too long and too technical and too

detailed, absolutely. But I really think the issue is -- it's not so much the target audience. It is what it is NRC is trying to talk about.

MR. CAMERON: Thank you, Steve. All of this is very useful. We are going to have a session this afternoon so that people can talk personally with NRC staff and Sandia people about this, again.

But let's take these -- go ahead, quickly, Kevin.

MR. BLACKWELL: Because one of your notes, for clarification, you had a note up there that it was DOE's responsibility. I think one would clarify that and say it's the shipper or regulatee's responsibility, because it's not only the DOE that's going to ship it.

MR. CAMERON: Good point. Thank you, Kevin. Let's go Bill Lee, then over to Bob, and finish up with Bill Ott.

MR. LEE: I support what Steve just said, but what I gathered out of this is you got to look at how the audience -- who is the audience. We're talking about dividing the audience in many different ways, technical, non-technical. What you have is something that is probably for a high school science teacher, something that some technical training that can understand.

But you got to have something that's non-technical. Age, I mean, you don't have something that

would be for elementary school kids or middle school kids.

My wife is a teacher and I showed her this and she got that glassy-eyed look. And then what they're talking about is you got to break it up into the regions, regional, local, urban, rural, suburban, how does it bring it down to the local individual.

They're not going to care about transport through skyscrapers, primarily. No. They're in the desert and a long stretch of road. But you got to give the people on the front line the variation of information to be able to be used for their locality.

The mountain regions, what about falling off them, a cliff, a mountain. Submersion three feet under water. Everybody is going to know that I can find a pond that is deeper than three feet.

So you got to give them the information and it probably is right, it's the shipper, the transportee, that's going to be needing this information to help convey the information.

MR. CAMERON: That's an intriguing idea to try to slant it to whatever particular area of the country or audience that you're trying to reach.

Bob, you're reading it and you've just fallen asleep, like Bill's wife and --

MR. HALSTEAD: No. I'm trying to decide if I

should say what I really think. I think it's a hopeless task. I don't think there is any way that you can put out a pamphlet that gives meaningful information to the public that will satisfy the people around this table, let alone a larger group of people that might review it.

I think for starters, write down "take out person rem." You didn't write that down before, and I'm telling you, that's the level you're at with the general public. You can't be that technical even though you try to explain it.

Secondly, I think it's inappropriate for you to proceed with putting out a pamphlet that's got these numbers based on 6672 on page 18, when hopefully we're going to get a chance to convince you that those numbers have to be reconsidered.

But I think there's a bigger problem for you here that you maybe aren't thinking about how the public reacts. For example, I think you've done a nice job of identifying a severe accident sequence here. I would differ with you on the probabilities and I would add -- I like to look at the loss of shielding issue, because that's a real concern for first responders at an accident.

In the real world, I think it's more likely that first responders get irradiated from an accident that doesn't lose containment than something that loses

containment.

But the point is you need to understand that the very fact that you're talking about this is going to bother people and I don't think there's any way, in a pamphlet, that you can reassure them.

That said, I want to point out, I don't think -- I mean, I appreciate what you're trying to do on 16 with the kind of fault tree. Just forget that. You can't explain that to the public.

You might explain it to a group of science teachers, if you've got them for half a day, and that's a useful way to use this kind of material in your outreach program. In fact, maybe that's how you should think about doing this, think about this is something you're pitching to a different kind of audience than the general audience.

I think on page 10, you have to be honest about the testing issue. I mean, look, if I was working for your site, I could give you some really good arguments about why you don't want to do full-scale testing and why some combination of half-scale, quarter-scale testing and a lot of analysis would do the job.

But given the position you're taking here, it's incumbent on you to admit honestly, A, we don't require testing; B, there are people who think there should be testing; C, here is why we think what we're doing is equal

to or better than testing.

You know, you got to be willing to put your true position out there and argue it. And there are people around this table like Bill and Steve who can help you make that argument.

I know Bill has also offered up a cask for us to test full-scale. So I know he's willing to think very expansively about this. We've been negotiating that for years.

I cannot resist but tell you that there is one issue here that's going to always undermine your credibility. When you're comfortable with a number, like a low risk number, you're not shy about giving the number. When you're uncomfortable about a number, like the dose rate and rem per hour on the surface of a ten-year cooled PWR, you're willing to say that it's highly radioactive and always shielded. You're not willing to tell people what a person standing one yard away from that assembly catches in 30 seconds and gets.

So you're not going to be able to satisfy the people around this table, let alone a larger audience. I do think you've done a better job overall with this pamphlet than the things I've seen from you in the past, but I think if your goal is to convince the public that the regulations are adequate to protect their safety, I'm not sure you can

do that in any effective way through this type of a program.

I personally think you'd be better off with a response that starts off saying, well, spent fuel is horrendously hazardous stuff. It's amazing we can transport it, but we can, because here is what we do.

I would really -- if I were on your side, I would start off by putting that surface dose rate up and saying -- I mean, it's amazing that something that could kill you in a couple of minutes can be put in a canister and hauled on the highways and there is some concern about getting an exposure equal to a medical x-ray if you ride along for an hour at seven feet.

But I just -- for whatever it's wroth, I'd much rather see you spend your money giving some more analysis. I really don't think you're going to get a positive result out of this.

MR. CAMERON: Thank you, Bob. Let's take one more comment up at the table from Bill, and, Judy, if you have -- we'll go to Judy next and then we'll finish up. Go ahead, Bill.

MR. OTT: Actually, this is in the idea of trying to be a little bit constructive on this. There are a lot of statistics around or analysis around concerning probability of fatal injury or injury resulting from airline transport, commercial airline, driving a car, whatever, things that

people do voluntarily, and this is -- I don't know if this is helpful or not.

But I'm just wondering if taking your conclusions and comparing them, okay, to fairly well accepted, well understood, similar type of statistics for common activities in a document like this might help people understand it a little bit better.

In other words, you're ten times as safe around a shipment of nuclear fuel than you are riding in a commercial airliner. Just kind of an idea.

MR. CAMERON: Thanks, Bill. Judy and then we'll give Mike the last word.

MS. TREICHEL: In reply to Halstead, I don't think they should say shipping spent fuel is a real dangerous thing, but we can do it. That's not their job. If somebody wants to do it, these are the regulations we require that they meet and tell us what the regulations are and possibly some justification for the levels that are set as regulations, but you don't have to -- as I said, you don't have to pitch it and you don't -- all you have to give is a justification for why you set those regulations the way you did and they will, by God, be enforced or that truck pulls off and doesn't go back on the road.

And for heaven's sakes, ditch the last deal about every day people have to compare risks, they're able to

relate -- in the case of spent fuel, they have benefits on a national scale. People relate to enabling the continued production of electricity.

So that doesn't even have to be said. Just tell us what the rules are, page 24, and that nobody gets by you, and that's what we want to hear.

MR. CAMERON: Okay. That takes us back to our message. Mike?

MR. BAUGHMAN: I guess my recommendation would be I wouldn't worry about putting anymore effort into this paper, because there's not many more people in the public or in the informed community than are around this table and in this room today that are going to read the material in the first place.

And so I wouldn't spend a lot of time and energy doing that. You might want to think about a SECY paper, a one or two-page policy statement by the Chairman that says we went through this analysis, we concluded that there's no reason to change any of our regulations, and let it stand at that, because that's really what you're trying to convey to the world.

And to think that the public, in any numbers whatsoever, are going to read this 20-page piece, a five-page piece or a one-page piece, I just -- it's not going to happen. It hasn't happened in 15 years in this

program, isn't going to happen now, so why bother.

The people that are informed that are communicating to the public in this room have read it and they've formed their opinions.

The one thing that's very disconcerting to me about this statement that you've reached is the way that the industry and the department, the regulatees, if you will, will react to this and that is they will conclude that transportation is a non-issue. The transportation risk, it can be done safely, we've been saying that, and so there is no reason for us to really worry a whole lot about it.

And it comes back to the concerns that Bill and others have raised about the local conditions. If anything, I would encourage you to include in here a disclaimer that recognizes that while the risks may be low and that the regulations we have in place may be sufficient to protect public health and safety, that we also recognize that there are local conditions that would result in perhaps significant variation in risk. Albeit those variations may yet be low and below the standard, but I think then it raises a question of fairness and equity.

Should Bill's residents in his community be expected to incur a level of risk which may be significantly greater than the risk in Illinois or someplace because of their physiography and conditions, and the answer to that

is, no, they should not be. But by overlooking that, particularly as a regulatory agency, it gives the DOE cover to not have to pay attention to mitigating those kinds of localized conditions.

And I can tell you out here, we're fighting that issue, day in and day out, to get the department to recognize that there are local conditions which warrant mitigation.

They look at something like this and say why bother. Why bother? The numbers are so small, why bother.

MR. CAMERON: Okay. Steve, did you have a quick response to that?

MR. KRAFT: Since Mike raised the industry, if you take what Judy is suggesting that the NRC do, which I actually think is right on, because, Judy, your correspondence with Shirley Jackson, when she was chairman, about NRC coming out here and explaining what they do, there's a gem of stuff there that she's telling you, that you got to come out here, maintain your independence from NRC, from DOE, from the industry, from everybody else, and say, look, we're who we are.

I like the term, we're the tough cop. They're not going to get away with shoddy QA programs and all that. That relates -- the answer is what -- the industry doesn't look at this and say, okay, it's a no never mind, just put

the stuff on the road and forget it.

What the industry then knows it has to do is have quality assurance programs, qualified vendors, testing in accordance with the regulations, certificates of compliance, trained truck operators, inspectors, all the things that you -- the way the risk gets down to where NRC says it is, all those things have to be done.

It isn't that NRC is saying put the stuff in a baggie and chuck it in the back of a trash truck. They're saying you have to do all these things to be able to ship, to have the use of that technology.

And that's what the industry worries about, that's what DOE ought to be worrying about in doing those shipments.

And, again, I go back to what I said about local conditions, I think you're right on in that that is a DOE issue, but I appreciate your saying the word mitigation.

I mean, if there is, in fact, a local hot spot intersection, Bob, where people, because they want to stand at that light and watch the trucks go by for a year and they are putting themselves at risk because they're in that seven -- excuse me -- they ought not be let out alone.

Someone, and it ought to be the state, as the protector of the local population, go to that intersection and tell the people that's a dumb place to stand, these

trucks go by here every other day, whatever it is, or some other mitigating -- whatever the mitigating factor is, don't go there, come up with a different intersection, whatever the right answer is.

My point is that, again, some of these things are not NRC issues. Some of them are.

MR. CAMERON: Okay. I'm going to ask Rob Lewis to come up, because we need to get started on the Sandia report. But if John and Bill Lake want to make a quick comment. John, do you want to?

MR. HADDER: I just wanted to say that after -- even though there may be difficulties with this, there's a lot of ways to improve it, I think it's still a useful exercise for the NRC to do this, to be able to communicate this information to the public, regardless of how it is used and to continue to work on that process.

MR. CAMERON: Thank you. And thank you all for the suggestions. We are going to give the audience time to get together with the NRC people on this issue, but if there is a burning point out here, we did promise to go to the audience for comments. So let's hear from Steve Frishman.

MR. FRISHMAN: Since Chip gave me my new job description this morning, I'm going to speak like a stern theologian here.

First, I'm kind of wondering who you're talking to

and why. What it looks like to me is that you got real carried away with the result that you really wanted to have, and now you're sort of bragging about it and if you -- if that's what you want to do, that's fine, go ahead and do it.

I think what your official objective probably is is to get something out on transportation that you think is acceptable. To crow the message that, hey, it's even safer than we told you it was isn't going to do anything for anybody.

And let me go on to a specific here that tells me that I can sort of read your exuberance and then there's another issue that's at hand that, well, this whole thing actually backfires on you.

Page 19, line -- in fact, the risks are significantly smaller than those estimated in the 1977 study. Then go over to 20, better casks or lower cask radiation levels did not cause these results. The marked reductions in risk result from the significant improvement and computer power for predicting fire and impact effects on casks, fuel rods, and fuel assemblies.

All right, first, in fact, the risks are significantly smaller than those estimated in 1997, no, they're not. The risks are the same. The estimate has changed. So already we're beginning to read that maybe there's a -- maybe there's a little motive behind this whole

thing.

You got to clearly understand, and if you were able to write this and let it through, then you got a problem.

Now, let's go to the next thing. Better casks or lower cask radiation levels did not cause these results. Here we are 23 years later, everything else in this country that has to do with public health and safety has been striving to make things safer, design safer things.

Here, the only thing you've done is designed a more powerful computer. You haven't made, by your own admission, one move towards making casks safer in 27 or 23 years. Now, do you want to be admitting that to the public? I don't think so.

It may be true and if it is true, then you don't understand what your real job is. I think Bill probably understands what his job is, but this is something that I wouldn't put on the street just in the fear that somebody like me might read it.

MR. CAMERON: Thank you very much, Steve. Okay. The next discussion segment is on the Sandia report, with draft recommendations on proceeding with a further study on spent fuel package performance, and we have Rob Lewis from the NRC staff to give us an overview and then we're going to go to Ken Sorenson for some more detail on the study.

Now, Rob is the Project Manager for this study, which we call the package performance study, and he's a nuclear engineer. He's been in NRC's Spent Fuel Project Office for the last several years and with the NRC for eight years total.

Before he came to the NRC, he got a graduate degree from the University of Arizona in Nuclear Engineering and his undergraduate background is in physics. Rob, I'll turn it over to you to give us an overview of package performance.

MR. HALSTEAD: Chip, just a question on process.

MR. CAMERON: Yes.

MR. HALSTEAD: After the presentations, are we going to go issue by issue and have a discussion of the rating and the cost estimate?

MR. CAMERON: We're going to go topical area by topical area, but we were going to start with collision and then thermal and then the route analysis.

So basically yes, but one of the things we want to make sure of is that we get the most important -- we focus on the most important issues in each of those topical areas.

MR. HALSTEAD: But in other words, you're not going to go in the order, in the way they're presented in the paper.

MR. CAMERON: Let me -- Ken, do you want to --

MR. HALSTEAD: Just so we know what script you're following.

MR. CAMERON: Okay. All right. Rob?

MR. LEWIS: Thanks, Chip. I will kick off the second half of the meeting, which is to talk, as Chip said, about the package performance study and, in particular, about the issues report that is attachment one to the mailing.

That is the results of the scoping phase of the package performance study and it will be used by NRC to define how we proceed from here on.

But, first, I would like to welcome back everybody that attended last year's meetings and thank you for the continued support of this project. I know it's a significant effort to come to these types of meetings.

I'd also like to welcome any new participants and assure them that it's not too late to affect what we do in the package performance study.

The first slide, I'd like to just briefly talk about what the package performance study is. We are building upon previous work, including the 6672 study that was talked about this morning. You can think of the package performance study as a built -- as an effort to build the case for the safety of our regulations, just as the modal study was to NUREG-0170, the package performance study will

be to NUREG-6672.

As we've mentioned, we are only looking at spent fuel transportation, both by truck and by rail. Other modes, such as barge or air, we haven't considered to this point. And the study is to look at severe accidents. It's not focusing on incident-free risks of spent fuel transportation.

One thing that's different about the package performance study than all the previous risk studies that have been done is the package performance study will consider the uses of testing and one goal, I think, one of our primary goals for today is to clearly describe what our goals would be of that testing and what the nature of that testing would be, so everybody is aware of how we would use testing in the package performance study to support what we've done in NUREG-6672.

In the package performance study, we're using an enhanced public participation process, compared to a lot of other types of research that NRC supports. This effort has involved a lot of public participation and I have a slide that speaks to that in a couple of moments.

The next thing I'd like to talk about is why we're doing the package performance study and why we're doing it now. There are several reasons. Some of these reasons are similar to the reasons you heard this morning for why we did

NUREG-6672.

Those reasons are we have increased modeling and testing capabilities than we've had in the past. We plan to utilize the best available information to make sure that our approaches are safe.

For the first time, the second bullet says that we know the designs that will be used potentially to ship to a place such as Yucca Mountain, if that's ever licensed, or to an interim storage facility, whether it be a centralized storage facility in Utah or another place.

We are currently in the process of certifying those types of designs, those dual purpose cask designs that are used for both storage and transportation of spent fuel.

And that's different than we've had in the past. In 1987, we had certified spent fuel transportation cask designs, but they weren't envisioned at that time as being used extensively for repository.

There's a potential for a large shipping campaign, obviously, if a storage facility or a repository comes into being.

The age of the data, the previous efforts, we would like to update that, the modal study data was from the early '80s, and that's about 20 year old data on accident rates, accident types. So there is some information available that the railroads have collected. We want to

take advantage of that information.

And the last bullet speaks to consistency with NRC performance goals and Commission direction. The NRC, the next slide shows those. The NRC has established four performance goals that are being integrated into all agency activities.

A couple of years ago we developed these goals. First and foremost, we want to maintain safety. We want to increase public confidence, where available. We want to reduce unnecessary regulatory burden, and unnecessary is a key word there because we do believe that in order to conduct activities with radioactive materials safely, there is a regulatory burden associated with that.

And we want to make NRC activities and decisions more effective, efficient and realistic, focus our efforts and our licensees' efforts and the public's efforts on those issues that are most important to safety and affect safety the most; therefore, it's an efficient use of resources and it results in an overall safer system.

The thing I want to say, although these performance goals are being integrated into all agency activities, the package performance study fits very well with all these goals, and I think it's a model within NRC, and that's just my opinion, but within NRC, it's one of the projects that we're doing that fits very well into all these

four goals.

The next slide shows our public involvement process that we have been using for the package performance study. We have established an interactive web site. It has a forum for asking questions and obtaining responses from NRC or from Sandia. The web site address is shown.

The web site probably is the best way to stay in touch with the study, if you're interested in doing so. But the last bullet speaks to a mailing list. We also have established a mailing list. If you received this letter in the mail, then you're on the mailing list. If you're not on it and would like to be, you can leave your name with Jim out at the desk and we'll make sure you're added to the mailing list.

Everything that we mail out is also available on the web site, if you have a fast internet connection.

And the third thing we've been doing, and today is part of that, is holding workshops and seminars. Last year, we went out to Bethesda, Henderson and Pahrump. The goal of last year's meeting was to collect views.

We're back this year to present what we've done with those views and we'll have a second workshop of this type in Rockville on September 13th, but we'll also be in Pahrump tomorrow night and we'll be here tonight to have a more public meeting, which has an open forum for discussion

with the staff.

We can move on to the next slide.

Where we are today with the package performance study. We are at the end of the scoping phase of the study. What that means is in a short period of time, NRC will make decisions about what issues that are in the scoping report will be investigated in the second -- in succeeding phases of this study.

The issues and the issue resolution report is out for public comment. The public comment period ends September 29th, I believe. If you look on the third or fourth page of the issues report, you will see an address where you can provide those comments. Anything that is said here today will be considered, but anything that we receive in writing or on the web site will also be considered.

There are three things that we're here primarily today to get from you with respect to the issues report.

First, we want to make sure that the comments that were made last year and that have been made in mailings and on the web site since last year's meetings are reflected in the report and that we have understood those.

The second thing that we would like to get today is your feedback on if the options that we've presented in the report provide solutions to those comments that were made last year.

And the third thing that we'd like to hear today regarding the issues report is if anything new exists based upon your reviews or partial reviews of NUREG-6672. In that, I would restrict that to anything new regarding accidents, as Susan mentioned earlier today. Anything that 6672 says about accidents is, of course, subject to further look in the issues report. Incident-free is not part of the package performance study. So we would address those comments in another forum.

And that's all I have to say. I'll turn it over to Ken at this point and we'll get into the details of what's in the issues report in as much detail as anybody would like.

MR. CAMERON: Okay. Thanks, Rob. Ken, are you all ready? Can you work from that microphone or do you want to sit up front with this hand-held?

MR. SORENSON: Good afternoon, everybody, and thank you, Rob, for the introduction. This presentation is basically an overview of the issues report that Sandia conducted for the NRC.

Joe, if you'd go to the next slide, I'd like to give you a brief review of the contents of the presentation.

First, what I would like to talk about is a little bit of the presentation objectives today, what we want to achieve; background of the issues report; and then an

overview of the findings. We plan on being interactive.

We talk about the comments and the proposals and then the associated ratings that we've given to these comments and then open it up for discussion to see what your reaction is to those ratings.

So for presentation objectives, the first thing we want to do is review comments that we've received from public input, present to you Sandia's interpretation of these comments, to make sure that we understood what was being said; third, discuss a proposal for the package performance study that would address these comments; and then, again, obtain feedback during this session on the assessment of these issues.

And this background slide is to just put into context a little bit of how the issues study relates to the package performance study. The package performance study, as Rob said, is an effort to support the evaluation of safety of transportation of spent fuel and it's specifically addressing severe accident type of conditions.

The issues report is subordinate to the package performance study in that it translates input that we get from the public from these types of meetings and other venues in order to propose technical programs or projects that could be applied to address the issues.

So how do we get public input? Well, there's a

lot of different venues, as Rob mentioned. First, there were four previously held public meetings over this past year, distributed the issues report in June of this summer for comment, launched an interactive web site, again, where we could get comments, and, fourth, we're initiating new public meetings, this one being the first, and extending to September 13th in Rockville, where we still plan on getting public input on this issues report.

Having assimilated the comments that we've received to date through these different venues, we've really been able to categorize them into three main topic areas. The first is cask and fuel response in the event of a collision accident. Second is cask and fuel response in event of a thermal type loading accident. And fourth is highway and railway accident conditions and probabilities.

Having categorized these comments, then, we also gave each of the comments a rating from A to D, and really the rating reflects the relative importance of the technical issue that would be resolved by addressing this issue, and also the intent then is to increase public confidence.

This goes back to Steve's comment this morning on, well, how are you going to do that, how are you going to address public confidence, and really the goal here is to get the public feedback that we need to make sure that we're addressing the right technical issues in the package

performance study.

Just another comment about the A to D rankings. These are a rank order sort of ranking of relative importance. It doesn't mean that D is unimportant. Just based on that criteria, we assigned a relative importance to these comments from A to D, and these are Sandia ratings only. They are not NRC ratings at this point.

So they are definitely subject to your comments and part of the interaction that we're looking for today is for you folks to look at these and see if we need to change some of the ratings on the comments.

The viewgraphs now differ from your handout. The handout that you have has a lot of text on it and it kind of follows the format that Rob discussed, which is what were the comments, Sandia's interpretation of the comments, and what is the proposal based on those comments.

In order to put this in a little bit more context, what we try to do is group the comments with -- in similar groupings and then give ratings, and we could look then at, for example, comments associated with collision and testing and look at those and all the ratings associated with them and then discuss them.

Bob, does that kind of make sense to you, how we're doing that? And in the issues report, the comments are kind of grouped on collision and thermal and risk. So I

think you should be able to follow along satisfactorily.

But this first slide, going back to the three categories, collisions, thermal and risk assessment, the first slide considers collisions and then we subdivided that into testing and analysis.

So all the comments that we've got associated with testing for collisions is on this viewgraph with associated ratings. So let's just go through this slide and then we'll open it for discussion in terms of your comments on the proposals and the ratings.

The first two comments really go together and you'll see, as I talk through these, how they link. The first comment, testing should be performed to validate analysis. I think we've heard over and over and over again this morning that we need to test. It's hard to understand the analyses and relate them to real world sorts of experiences and the public would feel much more comfortable if they actually could look at some full-scale testing.

What we've done in the past, of course, is done scale model testing and confirm the analysis to that and then did extrapolated the analyses to full-scale testing, without doing a commensurate full-scale test.

So the proposal is to conduct a full-scale cask test, rail size cask, to answer this question. We are giving that an A rating. We feel that's an important aspect

of the packaging performance study that go a long way in communicating to the public how these packages perform.

It would also mitigate a lot of the questions about scaling your analysis up from scale model analysis confirmed with scale model testing, scaled up to full-scale analysis, without commensurate full-scale testing.

So that's the intent of that proposal, A. Those types of tests are very expensive and so we also propose or suggest that we look at a third-scale model test, as well. It doesn't exactly answer the question of doing full-scale testing to confirm analysis, but we feel that we could learn a lot, again, from doing a third-scale test with the analysis and studying the scaling parameters of import with those tests and in the analysis so that we could make arguments on why it's okay, basically, to do a full-scale analysis without the full-scale test.

If we use the third-scale cask test, we give that a recommendation of a B.

Now, along those lines, the second large comment we had or important comment we had was validate scale model testing and that goes back really to very much the same issue. The confidence that the scaling parameters that are important are understood to the extent that we feel confident that we can do analysis without confirmatory testing on these very large-scale packages.

So the proposal is to do a study analysis on these scaling parameters to fully understand the scaling properties of the different parameters of import, to make sure that the analysis that's being performed properly captures the physics of the cask response, so that we get the proper cask response.

If we use a third-scale testing, as shown above, we give this a rating of an A, because we still have to make the argument, if we use this third-scale model test, we have to make the arguments of why it's satisfactory to go from third-scale model tests with validated analyses up to a full-scale analysis without the confirmatory drop test.

So the scaling study then would provide that justification.

If we do a full-scale test, as recommended above, that very much mitigates the need to do the studies. However, we still feel some use -- some good analyses could be done in terms of these scaling parameters with a full-scale test to, again, validate and confirm the scaling properties that are used for these different parameters, and we give that then a rating of a C, if a full-scale test is done.

The third comment on testing with collisions has to do with the response of fuel assemblies and the actually fuel pellets themselves. A lot of the data that was used in

6672, as well as the modal study, was based on some data that was experimentally done by Lorenz and Oak Ridge and it's a limited data set in terms of how fuel actually behaves in impacted thermal conditions, and the concern from the public in these comments is that we need to better define what is the response to fuel and fuel pellets to mechanical and thermal loads.

So we propose that that type of testing be done, so that we can better define how fuel and fuel pellets respond to mechanical and thermal environments that we would see in these severe accidents, and we give that a rating of an A.

MR. HALSTEAD: Given the way you've reorganized the issues, and I appreciate that that's a difficult thing to do without losing a lot of detail, and I don't have all my notes with me, but just from your first discussion point, I've taken half a page of issues.

I don't know how effective this is for you to go through the whole presentation and then have us discuss these issues point by point. I think we're going to lose a lot of detail and I -- I'm not complaining, but I did come prepared to talk about them in the order that they are in the scoping paper, and this makes it a little more difficult not to lose detail.

I realize we can do a lot of that detail in

written comments, but I think you're going to lose a lot if you try to go through all this material and then have us come back over these.

I think we ought to talk about cask testing before you move on, but that's just my position.

MR. SORENSON: We could certainly do that. We could take it item by item, if you would like to do it that way.

MR. CAMERON: Whatever way the group thinks is best to do it is obviously fine with me. I would just give one caveat, which is we may not be able to get into all of the detail that you want to get into and still end up being able to go through each area.

So we're going to have to do some sort of prioritization. All right. But Bob's suggestion is go to the scoping paper and, for example, the first issue under the scoping paper -- go ahead.

MR. HALSTEAD: I'd suggest two alternatives. One is to go back to those issues. The other is because we're kind of reorganizing the issues, to try and have Ken introduce the topic and see if people want to make comments at that point. Hopefully, we do not lose any control over flow of the meeting.

MR. CAMERON: Ken, would you be prepared to, for example, go to the first of the five areas that are in the

scoping paper, give us a quick overview of that, and then go to people for comment? Is that possible?

MR. SORENSON: Just a quick question. Bob, are you looking at the summary list or are you going section by section sequentially starting in the issues study?

MR. CAMERON: Bob, the summary list is the one back in here.

MR. SORENSON: Because it's a different sequence.

MR. HALSTEAD: Well, first of all, Ken, I don't know if other people are ahead of us, we're still in the process of developing the framework that we're going to use to give you written comments on the paper.

For example, on your first slide, which is your proposal for full-scale high speed rail cask impact test, I got five issues. I haven't got resolution of the issues, but I have five discreet issues. I suspect other people are probably in a similar situation. They know they're issues, but haven't necessarily finalized what they're going to tell you in writing.

I guess it goes down to the point, is it your intent to use this afternoon's discussion to help us understand what you want us to provide you in written comments in detail or do you want to leave this meeting with substantial input from us that's part of the record being taken by the court reporter?

I guess I should have asked that question earlier, but maybe you could clarify what you want to get from us this afternoon. You're going to get a lot of written comments from us anyway, but what you want to get from us around the table today.

MR. CAMERON: Rob, then Susan.

MR. LEWIS: Go ahead.

MS. SHANKMAN: Well, we have a limited time, so we need the written comments, and I think it will give you more time, and our comment periods goes through many more weeks.

I think today it would be good for everybody else to hear whether the A issues, the B issues, the C issues seem to reflect what people thought we were going to have in the issues report.

I think we need a sense today of whether we're on the right track. Now, within an issue, there may be some specific smaller details that need to be handled. I don't know that we can get to those today, but I think it's important for everybody to hear other people, because the written comments, although, if you make them on the web site, they're available to other people, I don't know how many people go through everybody else's comments on the web.

But there is a benefit, I think we feel, in having people discuss what's A, what's B, whether the collision issues capture most of the collision issues -- well, that's

redundant, but you know what I mean.

And that's, I think, what we need to do today, because we have about two more hours.

MR. CAMERON: I guess the other point, too, is there obviously is going to be an educational factor both from a description, but also from people hearing the rest of you talk about what's important.

Rob, did you want to add anything?

MR. LEWIS: No.

MR. CAMERON: Tom, do you have a point on that?

MR. DOERING: A point on the administrative activities. Looking at the review of the -- or accumulation of the information, I take a look at it a little twofold. Since I'm from EPRI, I get to play only in the technical areas, and that's sort of fun. So I take a look at some of these issues and say is this a technical issue or is this more of a demonstration issue.

And sometimes I would write differently if you would look at it as a demonstration versus a technical issue. So could I get some clarification on your As and Bs and Cs, if it's a clerical or administrative or demonstration versus a technical.

MR. SORENSON: One of the criteria that we used, as I mentioned earlier, was both technical issue resolution and what we said was increased public confidence. But how

we split those out was more qualitative. But it includes both assessments in the ratings.

MR. DOERING: Coming back on that a little bit. I guess, this morning, like Steve would say, I would be the poor engineer that would be run out, because I would try to explain it from the technical side, a lot of these issues.

And I take a look at it, sometimes I look at it from your A rating or B rating and say from a technical side, as maybe an applicant or a person demonstrating it to the regulator, is what am I demonstrating to the regulator, am I getting more understanding through the issues if I'm doing this calculation or if I were doing this test.

So that's actually my purview on it, that's sort of the way I'm taking it, can I explain it, can I prove to you that the system meets the regulations as they are set forth.

MR. CAMERON: Okay. We're going -- we're looking at -- and Tom's comment is focusing on the criteria for making something an A, B or C. It's a little bit of a different take on it and it's an overarching issue that I think we probably need to discuss.

We are still left with how are we going to proceed through these issues. Based on what Susan said, and, Bob, I want to give you a chance to put your two cents in here. Maybe the way that Ken was proceeding in terms of focusing

on what the A issues were is as good as any way to sort of give us a context for the area and then to proceed to talk about those A issues and get, for example, Bob might have some suggestions in terms of, well, there is a B issue in that that we think is an A issue.

But we haven't resolved that yet, but let's hear what Bob has to say and then we'll go over to Bob Halstead. Go ahead, Bob.

MR. ALCOCK: I want to ask, before we get into each of these issues, an overriding question here, and that is, you have a column of costs, very high, high, medium, and something.

MR. CAMERON: This is in the chart that is in the study itself, which is on, what, page (ii).

MR. ALCOCK: It's at the end of the report.

MR. CAMERON: All right.

MR. ALCOCK: Presumably, these costs add up to something, add up to double-high, I guess, I don't know. And presumably NRC doesn't have enough money to pay for everything.

So you have to make some choices here based upon what your overall budget is or what you think you might get some -- plus what you might get some help on from other agencies or other sources.

So my question goes to, do you want the comments

to be without regard to costs or as if your budget were unlimited?

MS. SHANKMAN: You're right, the budget is not unlimited. However, if we're going to spend our dollars, if we can agree on the A issues, if some of them are very high in cost, it may argue for why we need to ask for budget to do those.

I want to start off with we've asked for public input. The question we asked was where should we be spending our time and energy and resources, what are the issues that are of most concern, because we've been doing studies.

I mean, we talked about this morning. We did studies, and Bob used some unkind language, but quite frankly, maybe if we had it to do over again, it would have been better to send it out for public comment.

So now we're starting off with what are your concerns, what are your highest concerns, collectively, and whether they are technical or whether somebody feels it's a gut issue, I'm not sure that we care, as long as we discuss those issues and understand what the concern is and what our money would be buying us.

It may be that it's not a very weighty technical issue, but that we need to do some things to increase public confidence in the technical information we already use.

That is still an important thing to do. So I don't want to cut it into if it costs a lot of money, we're not going to do it, we'd rather do ten things that cost a thousand dollars than ten thousand dollar issue.

If it turns out, and, of course, none of them are ten thousand dollars, if it turns out that the ten thousand dollar issue is important to most people, then perhaps that's where we should be spending our effort.

So it's at the beginning of the process, we're asking, tell us what it is we should be considering, because without that information, we're going to do a study again that people may feel that we spent our time and energy in the wrong place.

So I hope I answered your question.

MR. ALCOCK: Yes, thank you.

MR. CAMERON: I think that's good. Judy has a quick question before we go to Bob, and then we'll see if we can figure out how to move through this discussion.

MS. TREICHEL: And this may be really dumb and if it is, just tell me, because I'm good at that. How come NRC has to pay for all of these things when there's a vendor that wants to get certified and be able to sell them? Can't any of that cost be held by the person who is hoping to make a whole bunch of money selling these?

MR. LEWIS: If we required a vendor to do testing

as part of a certification, the vendor would pay for that. The testing that we're trying to do in the package performance study is a little different. We're doing testing to look at how our entire regulations are set up.

So it's not testing to support any particular vendor's cask.

MS. TREICHEL: Okay.

MR. LEWIS: It's testing of our rules.

MS. SHANKMAN: But, Judy, they do pay in that we're a 100 percent fee recovery agency. So that our -- the industry and the certificate-holders and the licensees do pay for all of this work.

MS. TREICHEL: Okay.

MR. DOERING: Just a clarification on the issue we're on right now, with the vendors paying for some of the activities and things. Again, the Electric Power Research Institute, we do a lot of research for the utility base and a lot of these activities do come through that avenue, but also for the vendors, when they have to license a cask, there are some tests that are done. So it's not as if it's all analytical at this point in time. There are tests that are on hardware that are proposed and they get a certification on it.

So there is a lot of testing that's done in that area already.

MR. CAMERON: Thanks. I guess we better give Bill an opportunity to weigh in on this.

MR. LEE: On the testing, like, for instance, all the scale model testing, we fabricate and pay for the scale model and the performance of any of the testing that we may do in support of a license or certification activity.

MR. CAMERON: And this would be testing in support of generic research, which, I think, answers the question. Bob?

MR. HALSTEAD: Two questions about how to give you comments. First of all, I want to organize my comments to you the way I had originally planned, which is page and line and response to the scoping paper. If, however, that organization of issues is already passe, please tell me, because if we spend a lot of time doing that and then you say, no, we changed it --

MR. CAMERON: Not for the written comments.

MS. SHANKMAN: And they will be analyzed by issue, there is no question about that.

MR. HALSTEAD: Okay. Now, some issues won't be as important to us as others, but there are certain issues here that Ken is talking about. I have five critical concerns about Ken's first slide.

Now, do you want to wait until we get -- they won't take a long time to lay out, but I'm sure other people

are going to have reactions, too.

MR. CAMERON: Which first slide, the one with the As and Bs?

MR. HALSTEAD: The first substantive one, on the cask collision testing, because that seems to me to truncate a much broader discussion and there are some important things that I want to make sure aren't being left out of the discussion, some of which I think will actually be helpful to you, but I usually get in the most trouble when I try to be helpful to DOE or NRC.

MR. CAMERON: One thing that we could do is to just list all the issues of concern that people have and move through those and discuss them. It's not going to give people the context that might be necessary on them that Ken was going to provide, but that's one thing.

In other words, we could take your five issues, Bob, that are important to you, raised by this first slide, go through those and see if other people had a comment on them.

Mike, what is your -- do you have a suggestion on this?

MR. BAUGHMAN: Let me just apologize, because I seem to inject things sometimes that may not be real helpful, but let me suggest, first of all, I've heard two reasons why we're doing this study. One is to instill

public confidence.

Where is the empirical evidence that the public lacks confidence right now? And for a fraction of the budget that you're proposing to spend, we could quantify that. I suggest that be activity number one.

And Sandia Labs may not do that kind of work, I'm sorry, somebody probably should, though.

Number two, I heard that we're going to do this work to see how regulations, and I apologize, I don't know what the word was used, performed, hold up, or, in general, the notion was to judge the adequacy of our regulations.

Your year 2000 study has found that your regulations are working. They're acceptable. They protect public health and safety. You've said that.

So how will this study do any more to demonstrate that your regulations are adequate? You've already reached that conclusion.

So I would just suggest that given those -- that brings into question of why are we doing this at all at this point.

I would just suggest perhaps to the group as a whole, you're wondering -- you want input as to how we should spend our limited resources. The Department of Energy's budget for transportation is 1.8 million, if they're lucky. That's what is potentially in the budget.

And we've been talking and you, NRC, commented to DOE that you've got to do more work on routing and modal issues, give us more definitive information on what kind of routes you're going to use and what kind of modal choices you're going to make.

If there is a place where we need to spend money, let's spend it there. You already know your regulations are adequate. You told us that earlier. And I'm not convinced that the public lacks confidence.

MR. CAMERON: All right.

MR. HALSTEAD: Let me offer this. First of all, there is extensive literature by both DOE funded and State of Nevada funded contractors demonstrating, A, the public believes there will be accidents; B, the public believes they will be injured by accidents; C, the public believes the accidents are vulnerable to terrorism and sabotage, extremely well documented.

What is not documented is what it takes to change those opinions. I'll tell you about one of these issues in testing, quickly, and you can decide whether you want to shut me up or not. Five issues on the first proposal for collision testing.

One, Bob's issue about cost is absolutely -- the rail testing is so expensive, that you have to decide right off whether cost constraints determine whether you do

something or you don't do it.

Secondly, there is the issue we discussed in Bethesda, is it really necessary to do full-scale cask testing or can we do full-scale component testing.

We have identified bolts and seals as a major source of concern. Maybe we need some good full-scale testing, full-scale component testing, which would be much less expensive, although it doesn't answer some of the other issues and certainly doesn't have the same impact on public confidence perhaps.

Thirdly, it's a big question of whether you go with truck or rail. If you go with rail, perhaps you're making an assumption that isn't well justified. I mean, the vast percentage of current historical shipments have been by truck. I don't want to open all this whole issue, but we've done some analysis that shows that shipments to a repository, legal weight truck is very, very competitive with rail, and I wouldn't be going under an assumption that I should pick rail because rail will be what regional service agents contracting to deliver services to DOE provide.

You need to think that whole issue through. Fourth is an issue of whether you test a current model, an obsolete model or some generic mockup, whether it's rail or truck.

Then finally, there is an issue of how you decide what's the most vulnerable orientation. It sounds to me like you're doing this head-on test because you've got a track and a wall and we've done one of these before and the bricks have done them, but, in fact, that may not be the orientation that we want to test.

So that's my short list. I don't know the answers yet, but I do know the questions.

MR. CAMERON: Let me just try to do some organizational work here before we go on. I don't want Mike Baughman's comment to get lost here about maybe we're barking up the wrong tree, and that's something that I think Steve Kraft referred to earlier. So there's some sentiment for that.

There is also disagreement with that. I think that at least for the time being, it's an important point that's been expressed, but we also know that as Bob has just illustrated, perhaps, that there are some issues related to this study if we move forward with that.

I guess what I would suggest is that we see if there's any other testing issues around the table other than these and then we have a discussion of those.

Mike, go ahead?

MR. BAUGHMAN: Chip, this is specific to testing. I would recommend that -- again, it gets back to Judy's

question about perhaps who bears the cost. I think we have to be realistic. If you choose one type of canister -- I'm sorry -- cask and test it, do you think that those folks are predisposed to be opposed to these issues are going to accept those results being extrapolated on other casks that are manufactured by other vendors? No.

And do you think they will accept the results if you didn't test it in every orientation pattern? No.

So you have to realize that if you go forward in testing a cask, that you will still have a whole lot of questions that remain unanswered.

I would suggest that if we're serious about full-scale cask testing, adopt a regulation that requires a vendor who is coming in for certification to have each and every one of those cask types full-scale tested.

Now, that's an added cost to the industry, but it will result in every cask type that's in service, that's having perhaps been certified, having been full-scale tested.

MR. CAMERON: Rob, why don't you go ahead with that?

MR. LEWIS: I just wanted to clarify, Mike and Steve, that, in fact, in the issues report, in the ratings that we've identified or that Sandia has identified, I'm sorry, those ratings are not based on a quantitative measure

of public acceptance or of increasing public confidence in any way.

The ratings that are in the issues report solely deal with the technical merits of 6672 and the previous risk studies that have been done.

If, in the opinion of the authors or of the NRC, as we reviewed it, there was a public confidence benefit from any particular option, we may have mentioned it in the issues report, but it did not impact the rating.

The rating -- also, a rating of A does not necessarily mean that that's a rating that would challenge the adequacy of our regulations. A rating of A means that there is a shortcoming or an identified follow-on research issue, technical issue in 6672 that could benefit from further analysis or tests.

I'll leave it at that.

MR. CAMERON: Okay. We heard another suggestion from Mike about requiring each vendor for any cask they try to get licensed to do full-scale testing for that. Bill, you look like you want to make a comment? Bill Lee. Then we'll go to Bill Lake.

MR. LEE: If we go through and make every cask design that we license, it will add to the ultimate expense. And I don't think that we actually gain that much public confidence in testing every single cask design that every

vendor licenses and I don't think that's a regulation that we put out there in other industries that gets regulated.

So I would not be supportive of testing every design that we license.

MR. CAMERON: John, you've had your card up for a while. Let's hear what you have to say and then go to Bill Lake, and then Steve Kraft.

Go ahead, John.

MR. HADDER: Thank you. I actually -- I think I would prefer to go through the document as it is, sort of the way Bob had suggested earlier, because that's how my comments are written out and I think that would be the most efficient way to move through it in terms of the process suggestion.

Also, I was concerned that with the old viewgraphs, it did seem like the comments were recrafted and I feel like there was some information maybe lost there.

So I kind of would not -- I would rather go through the document, if we have time to do that, as much as possible.

There is -- I also wanted to mention that I think that there certainly is evidence that public confidence around the program, and I know Bob mentioned a couple things, but just comments from the DEIS hearings that the DOE did, there's pretty clear evidence there, as well, that

people do have confidence concerns.

Also, I think that if every cask was full-scale tested, I think it would go a long ways for public confidence. Whether or not we're going to do that is still another issue. It may still not address other things. But I believe it would. Certainly, I get, from personal experience, the conversations that I have with the public, they would certainly be impressed by that.

A lot of it's related to what kind of -- what efforts you are making to create an open forum to create a sense that you really are protecting the public. So, yes, sometimes it is costly, but that's what I'm saying as far as the confidence.

And if the full-scale testing is done in a meaningful way, and that's one of my concerns, also, is that the testing connects to regulations, that it connect to real world things, so that it will have meaning for the average person, as well.

And that's one of the problems we've had with some of the tests that have been done in the past, is that they haven't really connected at that level.

So I would like to recommend that we move on with comments regarding the document and that process.

Thanks.

MR. CAMERON: Bill Lake.

MR. LAKE: Thank you, Chip. Two points on the testing. One, we're talking about testing here for severe accidents, not regulatory testing, and if I read the Sandia document correctly, the concerns, small they may be, had to do with the extra severe testing, because the materials of the casks go in regions that are less well known.

The second point, of course, is what kind of test you should do, and I think some of the recommendations that came out of the December meetings do, in fact, appear in here, that the test should be directed, whatever test is done, should be directed at benchmarking calculational methods.

The advantage of that is that you can then take the code, the computer code that you have great confidence in or much more confidence, and examine many, many different orientations, many, many different casks, so you really get value out of that test.

Thank you.

MR. CAMERON: Okay. I think we're sort of stumbling along here. Let's hear Tom and then Steve Kraft, and then let's go back to perhaps these major issues related to each area, testing is the one we're on now, and see if people have comment on that.

MR. DOERING: Dealing with the -- building on what Bill said on the testing activities and what we've heard

from Bill Lee on testing, individual ones, it's the confidence that we need to get from the public, but, also, from the engineering point of view, this is where I'm talking, again, from the research side, is what do we gain and how do we understand the process.

The codes have to be -- and this is, again, building confidence in areas. The codes that the industry uses are well benchmarked into the area that they are investigating and have to meet the regulatory requirements in that area.

So looking at the -- just simply doing a large-scale or a full-scale test, from an engineering point of view, really, unless you construct it correctly, will not provide you any more information than doing it by a calculation that's well benchmarked already or doing certain component testing of critical components.

So we're starting to go into that area, what's an A and a B, and why do you have it, it's for public confidence or is it for regulatory requirements.

And coming back from the background that -- from EPRI, we are looking for the technical background to be tight and solid, to make sure we meet the regulations, and then we also have to take a look at the public confidence and we have to balance those two.

MR. CAMERON: I think that I'm going to make a

suggestion here for how we move through this and I think that we just need to decide -- not only dinner, but to bring the sleeping bags and whatever else we need.

But it seems that under the collision area, testing is the big issue and there's a number of issues in regard to testing and Tom just reaffirmed one of the issues we heard, was perhaps do full-scale component testing rather than cask testing.

Tom also brought up a point in terms of these overarching criteria and I think before we go anywhere, we probably need to discuss this at this point. So let's give Steve a chance to say what he was going to say and then let's talk about this criteria, and then let's move into the testing issues that people want to raise. Steve?

MR. KRAFT: Have you noticed that putting your name up to get recognized in this kind of meeting is sort of like buying futures on the stock market? Because by the time they get around to you, you have no clue what the conversation will be and the point you were going to make before is, A, no longer relevant, not of interest, but, boy, there's all this other stuff that went on, that you can now sell at a far higher price.

But my point is really just procedural, because I think NRC is stumbling into something here that will give some people some pause, because if you were upset that you

didn't know about 6672, you're going to be upset about this one, too.

Bob said they are doing something about writing comments, framework for comments, and I said comments, comments, where did I see comments, and I went back through all this paper in front of me to find out where the one mention is about asking for written comments on this, and it is buried in Sandia's report.

Time out, foul. The NRC does not ask for comments from the public on a document that goes under an NRC letterhead with the comment request buried in page four of a contractor report. Where is the Federal Register notice? When does the clock start?

Frankly, if I hadn't heard Bob say they are putting together their framework for comments, I would have said I -- this came out in the middle of the summer and, excuse me, we're a small office, I missed the fact that there was an opportunity to provide written comments on this, other than the normal opportunity to write a letter to your government any time you feel like it, and we're going to go back and do that.

I would just make the point to the NRC, that's not -- it should have been in the Federal Register notice for this meeting, that that was available September 29th, or the specific date. I mean, you're going to run into the same

sort of procedural things that you run into all the time when people never heard about something and never did anything or whatever.

So I'd just point that out to you.

I had nothing of substance to say. That's why I said it like that. By the time you come around to me again, who knows what you're going to say.

MR. CAMERON: Certainly, if there are people who feel disadvantaged by the fact that there wasn't any notice in the Federal Register on the ability to provide comments, the traditional mechanism is to ask for an extension on those.

Susan, do you want to say anything about that?

MS. SHANKMAN: I think that comments will be gratefully received, even if they're received after the date that we've requested comments and we will try to incorporate them.

The Federal Register notice, I think, talked to the fact that we were having meetings, that we wanted comments, and I think in all the meetings, the web site, everything we've done, Steve, we have said we want comments on this.

What I'd like to do is use our available time to make those comments and if you want to talk to me, you know, maybe we could have done a better job of getting the word

out, but I really am feeling the pressure of time and would rather talk about the study than the mechanics of how we got to here.

MR. CAMERON: Okay. Mike, comment?

MR. BAUGHMAN: Yes, Chip. This gets right to -- you wanted to go to criteria.

MR. CAMERON: Yes.

MR. BAUGHMAN: I think let's jump right into that. You've got three A, B and C criteria, then we've got a table on page three which gives a definition of these actually four criteria. So they are fairly well laid out. I don't really think we need a detailed presentation. It's very well described.

I would note, on page one, one goal of this study is to respond to those concerns by performing studies that will enhance public confidence.

I do not see in your definition of criteria anything having to do with public confidence. So it seems to me that one part of your criteria should be does this study indeed or will this study enhance public confidence.

That's not included in your definitions.

MS. SHANKMAN: No. And I will tell you that there was a second list ranking by Sandia on public confidence and we asked them to leave it out because we felt that the comments by the public should be the ones that determine

what are public issues for public confidence.

So the Sandia ratings don't speak to it, but we would welcome people making comments on whether they feel that doing a particular part of the study as proposed will answer their public concerns or will just -- the outcome of that particular part of the study wouldn't matter to them in terms of what they believe about transportation.

MR. BAUGHMAN: I guess then the follow-up would be the definitions you do have for A, B, C and D on page three, do these infer then, for example, if it resolves a very important technical shortcoming, does that imply a regulatory change or if it's an important technical shortcoming, rather than very important, does that imply a regulatory change?

It seems to me the criteria may have something to do with whether or not we think there's a regulatory outcome. If there is no regulatory outcome, then we're really looking at public confidence and we ought to say that.

MS. SHANKMAN: Can we move back to what are the ones in this study, if any, and I get the feeling, Mike, that there are none here that you feel should be done. So what I would like to start off with, other people, whether they feel there are things in this study we should be doing and why they think we should be doing them.

And if they feel that the comments in the report, whether they're rated A, B or C, whether they're expensive or not expensive or relatively expensive, whether they feel that it captures the comments they made before or the comments that they know others made.

If we can focus on that, I think that will move us ahead. I'll give you that maybe we could have been better in our rating criteria. We were more interested, or at least I was more interested in making sure we captured what people's concerns were and we talked about how we could go about scoping out a study for them.

MR. CAMERON: Susan, I don't want to miss Tom's comments on criteria, too. I mean, we have the criteria in here. Obviously, that's how we ranked the issues, and we'll just have to take that with a grain of salt as we go through them.

But we have Mike's comments on criteria. Tom, can you just repeat yours?

MR. DOERING: The comments on criteria, if it was focused toward an engineering resolution for a public confidence resolution, they would be --

MR. CAMERON: So when you said administrative earlier, you meant that was a word to describe public confidence.

MR. DOERING: Right.

MR. CAMERON: And public confidence can have two meanings, as it comes out. One is was it -- how well did it respond to public comments, plus the broader public confidence terminology that we've been, I think, using today. Is that correct, Susan?

MS. SHANKMAN: Yes.

MR. CAMERON: Okay. So I think that the issues you and Mike are raising are similar. I even asked you whether you think -- you or Mike, whether you think there should be, in those criteria, public confidence or not or whether it should just be technical merit.

If you want to express an opinion on that, please do. Should it all be done on --

MR. BAUGHMAN: I would just suggest that --

MR. CAMERON: And what does technical merit mean?

MR. BAUGHMAN: If it's technical, there has to be a regulatory link. And if you have decided that there is no need to amend your regulations, which the Risk 2000 study tells me, and you told me that earlier, there's no reason to do a technical study. Maybe I'm off base, but that's the conclusion I reach.

MS. SHANKMAN: I hear you, but we're under a mandate from the Commission to continuously evaluate those findings. So we're moving forward into severe accidents.

MR. BAUGHMAN: But you could recommend to the

Commission, as staff is also mandated to do, that we don't need to go down this track. I mean, I'm just saying the Commission isn't locked into this, if there's reason not to go forward.

MS. SHANKMAN: In transportation, it is.

MR. BAUGHMAN: I disagree. I mean, if the Commission is not going to amend its regulations as a result of this work, then why are you doing it.

MS. SHANKMAN: Okay. I'll take your comment.

MR. BAUGHMAN: Then it would come to public confidence and I guess -- you know, if public confidence, which I think that's a real big reason as to why you're going down this track, then we ought to think about which of these really do contribute to public confidence and I think we could do that, we could talk about these that may or may not contribute to instilling public confidence.

MR. CAMERON: I think we've heard from Bob and we've heard from John that they thought there are public confidence issues that could be demonstrated here.

MR. DOERING: Just to follow-up on Mike a little bit. I guess I'm approaching it a little bit differently, because I know, in the industry, there is already testing underway and for every cask vendor getting licensed, there is testing already being done out there. So we are very much in favor of testing, but testing that would support the

engineering activity and then also testing to make sure the public confidence will be there.

So there's a little bit slight difference, because we know there's testing already underway or in process right now, and what we want to take a look at is we have to review in this what does the additional test really help us with.

MR. CAMERON: Good. And I think that will help us when we, in a second, hopefully, move back into the testing issues. But let's keep going on this criteria issue. Bob, do you have a comment on that, and, Bill Lee, do you have a comment on that? Go ahead.

MR. ALCOCK: As somebody who has worked in this area of public confidence for a few years and shipping of spent fuel, I disagree that that ought to be one of the criteria for choosing the scope of the study here. I think what we're about is filling in some technical gaps we have in severe accident scenarios, such that when we get to the point of evaluating, not only from a regulatory point of view, but from an engineering point of view, the casks which will be used to ship commercial spent fuel to wherever, that we will have a better technical base to make judgments about those casks.

And then we construct the message which hopefully will build public confidence. But right now, we have a body of knowledge. It has some gaps. We're trying to fill in

the gaps, as well as add to it by a minute amount.

So I don't look at any of these proposals here as working de novo on whether or not casks are safe, because we have some knowledge about that. We just need to do a little bit more work.

So I would argue that the criteria seems to me, if it's based on a technical evaluation, is more appropriate in this case. I would go back to the conundrum I have, though, about offering comments whether an item in here should be an A or a B or a C, and that is because I'm on lost in this cost world, that knowing that the costs are not -- I mean, the resources are not unlimited, probably guessing that Sandia would like to do more than NRC can pay for, because that's the normal course of things, but also understanding that maybe the Department of Energy can help bring those costs down by being -- thinking out of the box about providing some certain resources.

So what I'm suggesting, though, is that if you want comments without regard to cost, that's fine, but in the back of my head, I know that NRC is going to make some choices here that are going to be based upon cost in the final analysis.

MR. CAMERON: It's hard to obviously ignore costs, but I think that we're going to have to try to move through and at least get an idea of what each of these issues might

bring to whatever objective we're trying to achieve here, whether it's technical merit, and if that's defined by a link to the regulatory framework, as Mike suggested. I'm not sure that you agreed with that, but I think that we need to, at least for this discussion, move through the issues and if we think something is really important, then maybe we go to your solution, which is let's try to get money from DOE or vendors or whatever.

I think that's the way we might need to approach this at this point. Bill Lee, and then Bill Lake.

MR. LEE: I'll try to frame this in the sense of the rating system, but apply it to the test issue that we started. Getting back to what is the real reason for the test. It looks, it should be a test to the regulations.

As for public confidence, I'll put it as beyond the regulatory terms, but it's the rocketsled or something else, submersion that's deeper than the regulatory to instill additional public confidence.

You need to determine what's the reason for the test and then you will address it accordingly, you know, if it's technical or public confidence.

MR. CAMERON: That's sort of goes back to the basic point here. We've heard two basic criteria that would apply to, for example, testing or anything.

One is technical need. Now, Mike Baughman

suggested that that must mean -- that should mean a tie to the regulatory framework. Do people agree with that?

MR. ALCOCK: Not necessarily, no.

MR. CAMERON: What are the other options?

MR. ALCOCK: Well, I'm not an engineer, so I'm not saying I fully understand this. But we have a body of knowledge, be it in codes or in some other form about cask performance in certain situations, and if we -- there's a reasonable presumption that some of those codes don't give us the information we need to be able to predict cask performance in severe accidents.

So in my head, we have a technical need there for more information.

MR. CAMERON: Let me ask Ken. Ken, your understanding in terms of technical need, from the Sandia point of view, is that -- was it Bob's description, includes Mike's or what? What was in your mind?

MR. SORENSON: I think the difficulty is there's a big gray area sometimes between the technical answer and whether that indeed builds public confidence or not or if there is a need to advance some of the technologies, if that really serves the right purpose.

From Sandia's standpoint, we gave the same rating. It was based on technical merit. We conducted these full-scale rail cask analyses under very severe accident

conditions and determined mechanical and thermal responses.

The reason for giving this an A rating was to do the test and then tie that back to the analysis that we performed and either verify or show where we needed to make improvements to those analyses.

But I think in terms of the public confidence, Judy made the point this afternoon, show us what the worst case accident is and what is the consequence, and we can do that with analysis, but without actually doing the full-scale test, I think it's hard to instill the confidence in the answer in the analysis.

So if we can tie the analysis to the test and confirm the analysis through that testing, I think that will help not only the technical fidelity of the analysis, but also help the public confidence, as well.

MR. CAMERON: All right. Bill Lake.

MR. LAKE: Thank you, Chip. I would just like to spend a moment on the concept of public confidence. If I recall, from the earlier meetings, we were talking about stakeholders and the stakeholders include both technical and non-technical people, and I think the NRC process, as Susan explained it, seems quite reasonable. They gave the job of identifying the technical issues to Sandia, who is expert in this area, but left the other to us, some of us are technical, some of us are not.

So I think it's our opportunity to raise the issues, both from technical and non-technical people, and the NRC, of course, is stuck with the unfortunate job of going through these comments and deciding how to construct further studies, if they wish to.

Thank you.

MR. CAMERON: Okay. I think that your point about it's going to be left to the NRC to try to put this all together, we have a number of suggestions on criteria here. I don't want to leave today without people having an opportunity to comment on the Sandia report, at least on their major points on the report, and I think that the NRC and Sandia really need to think about what criteria are we going to use to decide to move forward with this, given what you've heard today.

I still think that there -- and I would ask this as a question. I don't want to make an assumption for the group.

But is there still merit in -- even though we know that the criteria might have to be recalibrated and, in fact, as some have pointed out, we should be working on an entirely totally different issue. Is there still merit to going through the major issues in collision, thermal, et cetera, et cetera? Bob?

MR. HALSTEAD: I want to make a general comment.

For 11 years, the State of Nevada has been asking the NRC to reopen the modal study. We were dissatisfied with the initial modal study, the analyses that were done.

We work from a position where we are not convinced that the current regulations are adequate. We've sought changes in the regulations. We're also willing to admit we might be wrong. The regulations might be okay. We're just not convinced by the body of evidence that's been presented.

Hence, we welcome greatly what the Commission has done so far in opening this proceeding, and I think we are trying to count angels on the head of that plutonium pinhead again by arguing over criteria here.

I've known Mike for many years, respect his opinion, I think he's off base by redirecting this.

Secondly, the issue of this meeting, I thought this afternoon was for us to come here and review an issue paper that was prepared by the staff at Sandia. Boy, it's a rare day when I get to say something good about the NRC and Sandia on one day.

This is one of the finest pieces of work that Sandia has ever done. It very concisely captures 20 years of adversarial science. It even fairly represents most of the comments that I made, most of the comments that the Association of American Railroads have made, who are a very key player in this and have almost always been ignored in

this.

I can't speak for the industry. I thought that many of the industry's issues were very fairly presented here.

I do understand the issue Mike is raising that the Commission has to ask what the hell they're doing, if they're going to do something that's going to lead into the expenditure of resources, and they need to figure out down the road whether they're working on a public confidence issue or a regulatory issue.

That's a fair issue to raise. But for me, and I don't know how this applies to -- I spent a lot of time thinking about this issue paper. Unfortunately, I had to divert energy to go through that 6672 stuff this morning and maybe for all of us, that's part of what was lost here.

I think this is a very valuable opportunity to review the Sandia issue paper and see whether we think they have captured the issues here that need to be discussed. Why should the Commission be dealing with this issue at this time? I think the initial explanation that was given is the one that counts.

We are on the verge of a major change in spent fuel transportation environment in this country. We're going to go from a situation where we've been shipping somewhere less than 100 shipments a year for the last ten

years on average, to a situation where we may have hundreds or even a couple thousand shipments per year, every year, once the system is ramped up, more waste will be shipped than has been shipped in the last 40 years.

Furthermore, as has been pointed out, there are substantial changes in the technical tools that are available for doing safety analyses. The State of Nevada believes that this is a very appropriate time to be conducting this type of an inquiry. People are at this table with different agendas. I hope to convince the NRC that they need to change some regulations, but I know I have to assume a burden of proof to convince them to fund experiments that might document those things.

Other people around the table have other agendas. I will say that so far, participation in this proceeding, as one of the few things the Commission has done in the last ten years, that, A, addresses what the State of Nevada believes are valid regulatory concerns, and, B, gives us a valid reason to have enhanced confidence in the ability of the Commission to make fair and objective decisions.

I hope that isn't lost. Again, I don't say that these issues that have been raised aren't important, but I think we've kind of lost the focus on what we should be talking about this afternoon.

MR. CAMERON: Okay. Well, let's jump into the

testing issue. Bob has raised five points that we'll go over. Are there other testing issues that people want to raise? John, did you have a testing issue?

MR. HADDER: Those are the five there.

MR. CAMERON: These are the five. One was cost, and I'm going to ask, when we go through these, ask Bob to rearticulate these, but one was do full-scale --

MR. HALSTEAD: It's really Bob Alcock's issue. Do you make a judgment on expensive issues, assuming -- I believe this test that's been proposed costs a minimum of four to six million dollars, unless Bill gives us that old NLI-10 rail cask for peanuts, but I don't think he can do that.

But I think we're talking four to six million dollars at least to do this test in a way that would be satisfactory when all the nuts and bolts are worked out. It might be more. It might be ten million dollars.

MR. CAMERON: Your second point was that full-scale component testing may be sufficient in some cases rather than full-scale cask testing. I'm running through these for the benefit of everybody, so that they know.

MR. HALSTEAD: Both the discussions we had at the two previous meetings and my reading of 6672 and the peer review suggests that the major areas of uncertainty identified so far really come down to bolt failure, lid

deformation, seal failure under certain temperature impacts, and then there are some related issues with the fuel. I don't want to mix them all up here. But I'm not sure that I could argue that it would be a good public policy expenditure to spend the millions of dollars necessary to do this to resolve these issues without at least seeing somebody do a scoping paper that says maybe we could do this cheaper by looking at failure thresholds for bolts and seals.

MR. CAMERON: Okay. And I'm going to come back and we'll ask Sandia and the NRC to tell us how they considered that. Truck or rail, I just want to make sure everybody understands your issues, so that they can put any issues they have on the table on testing, and then we'll discuss them.

Truck or rail.

MR. HALSTEAD: Truck is cheaper and easier. There has to be a pretty good reason to go with rail. I'd like to hear the rationale for that.

MR. CAMERON: In terms of doing the test.

MR. HALSTEAD: In terms of doing a full-scale impact test as described.

MR. CAMERON: Okay. Which cask are you going to use, that was pretty obvious, I think, current cask and obsolete cask. Then there was another one that you --

MR. HALSTEAD: I would argue there is a real advantage in using -- I don't want to endorse Bill's equipment for a particular reason, I guess, but a workhorse cask we have a lot of experience with, like the NAC-LWT, that many of us have looked at the safety analysis report.

It's a situation where you're probably going to have repeated recertification of that package.

I think if you were going to do full-scale testing, I would argue there is a strong reason for spending that money on a current model test, both for regulatory analysis and for public confidence reasons, but I could be wrong, because as I say, if there is an obsolete cask you could get cheap and somebody can argue that you get the benchmarking benefit for 500,000 dollars versus 600,000 dollars, I might be swayed by that. But you will not get any public confidence benefit by going with an obsolete cask, no matter how you argue that the benchmarking is enhanced.

MR. CAMERON: And your last point was what's the most vulnerable orientation in terms of testing.

MR. HALSTEAD: I have a strong opinion that with a truck cask, the sideways impact on a protruding surface is probably the most serious -- is probably the most vulnerable orientation of a test. It's also the one that's most difficult to do.

So someone has to convince me that it's worth spending five or six million dollars or more to do an end-wise crash of a rail cask.

I'm open, but I ask the question.

MR. CAMERON: Okay. Other issues related to testing that people want to put on the table at this point? We'll go and discuss them. John?

MR. HADDER: I just -- from our perspective, another kind of requirement, I think, of a full-scale testing, as I said before, is that it connect to things. What I would like to see is the test should connect to modeling processes, so that you can -- while I realize there's already benchmarks out there, but this is a real benchmark that people can really believe in, as well.

So it should definitely connect to -- the test should be able to be predicted by the models and also that should be connected to quarter or third-scale testing, so you can show that extrapolation all the way to full scale.

That's really important. It also should connect to the regulations, too. So now you're beginning to get your testing program and your regulations come together.

And the third piece of it is -- and that may not be encountered in this study, but it also has to connect to the real world.

Like I said, that may not necessarily be part of

this, but to demonstrate that -- basically, the way I see it, it's a triangle. You've got real world scenarios. You've got your modeling, scale testing, and then you have your regulation, and they should all talk to each other.

If they don't, then the public is never going to have confidence in it, quite frankly, I won't. And so that's -- and that's more than just a confidence issue.

But this also builds a very strong base from which you can do everything else, because now you've shown, you've demonstrated this science clearly.

So that's what I wanted to throw on the table as far as testing. If it doesn't do that, then I think I have some concerns with it.

MR. CAMERON: It has to do all three of those things.

MR. HADDER: Ideally.

MR. CAMERON: Other testing issues, before we go and examine other ones? We'll go to Bob, and Bill and Judy. Bob?

MR. ALCOCK: I want to give a non-technical person's viewpoint on here. And I'm not, with all due respect to my friend who represents the State of Nevada here, I'm not sure I want to buy into his agenda here.

The way I would go about this is say, well, let's gather data on severe accidents, be it highway or rail, that

have occurred and see if we can understand the forces or the dynamics, both mechanical and thermal, that occurred there, and then, almost theoretically, assume that a spent fuel cask, loaded, was involved in that accident.

Do we have the data to be able to predict the performance of the cask in those real scenarios? And the extent to which we don't, we ought to conduct tests.

Now, whether that involves a full-scale test or half-scale test or just test the bolts or component, fine, I'll let the engineers decide that, but my overall point is that what we're doing, proposing to do ought to build upon the data and the context of the engineering information that we already have.

MR. HALSTEAD: For this particular proceeding, I totally agree with this. And you'll remember, we provided about a page and a half of historical accidents that we thought should be investigated.

Our position remains that at a minimum, it would be a good idea to have full-scale testing per the four cask performance requirements, as part of certification, and that position we have taken is also based on an assumption that there should be standardization of the truck and rail casks. I agree with Bill. I don't want to see 11 full-scale rail casks tested.

I mean, remember when we started this program, we

were going to have a competition to pick designs and then we were going to both save money and make it easier to train people and basically I don't hear any talk about the French standardization model anymore, but that's what a lot of us were influenced by.

So in the larger sense of what should be done for package certification, State of Nevada still has a position in favor of full-scale testing. That's separate from this. Right now, I feel that that's the whole problem with the way we've reorganized these issues and I hate to say this, but the way the issues have been reorganized, it seems to me, have destroyed what I thought were all the good things that were captured in this report, because now we're in this process of prioritizing these things instead of just going through the report and saying anybody want to add anything here and see what was captured.

But I would fully agree with you at this point that one of the dangers we have with the way this is presented, by putting cask testing up front, is there were all these other things that affect the decision of whether you, A, need to do this full-scale test or, B, whether you can afford to do it. That's separate from our position on another issue.

But I fully agree that we ought to see whether we really need to do these tests and we ought to see whether

the tests that we're configuring reflects the kinds of extra regulatory forces that we think these historical accidents represent.

Otherwise, it's a waste of money.

MR. CAMERON: Thanks, Bob. Bill and Judy, on testing issues, and I guess for better or worse, we're sort of -- that's the orientation we're on now rather than the topical orientation, and hopefully that can be filled in through the -- will be filled in through the written comments. Bill?

MR. LAKE: Thank you, Chip. I'm going to risk violating your request to stick to the testing issue, although this relates to testing.

First of all, I agree that this is an excellent document. I think Sandia did a great job at ranking these issues from a technical standpoint.

I do, however, have one disagreement and maybe I don't understand what was done in this one. There's the sensitivity issue, which I think reflects on this question of which test you do or which things you do.

Sensitivity is listed as a less than 100,000 dollar activity. Now, if you do the sensitivity analysis before you go in or firm up this ranking list, you probably would have a good understanding of what's going to affect your results, how important is what you feel you don't know

and need a few more answers on, because I think we all have our favorite issues, I know Bob does, I know I do.

But I think I would break this next phase into two separate steps and maybe give the sensitivity an A plus rather than a B, as it is given here, and look at the sensitivity analysis first, see what's going to give you the answers you need, where is your knowledge the softest, and that's where you go in and make your investigations.

Thank you.

MR. CAMERON: Okay. Does everybody understand the sensitivity analysis issue? All right. Judy?

MS. TREICHEL: Two things, very quickly. I don't know enough about this to know the answer, but when you do full-scale testing, do you test to destruction or only up to a cutoff point? Do you set the temperature of the fire, do you set the duration of the fire, you drop it just so far?

I would say if you're going to already dig in the five to six to ten to however million, you should test to destruction, because that is really helpful if you get into a real bad situation.

And I think it's pretty silly to even go on with the public confidence argument, because I think you should test as much as you can in every direction that you can and as comprehensively as you can, just so you do your job well and so that you are protecting public health and safety.

Some people may be confident that you do it or that you don't, but if you want confidence, you just do the job well. You can do all kinds of cosmetic things or you can show -- I don't think the last films that were made bolstered public confidence. They sure tried to make them do that, but they didn't, because -- the Sandia crash test. Haven't you seen the train come flying across the planet?

MR. KRAFT: I have that in my briefcase.

MS. TREICHEL: I just knew you'd never leave home without one of those. And then we -- there was a local news team that went to Sandia that did further checking and so-called debunked some of them.

But I just think it should be done right and then my own disclaimer is I think it should be done right not because there's going to be a full-scale testing campaign in -- or, I mean, transportation campaign in this country, because I don't think it's going to happen, but I think spent fuel is going to be moved within utilities and moved a little bit.

I don't think Yucca Mountain is going to happen and I don't think anybody needs to gear up for that. You just need to be careful of doing something this difficult and this dangerous.

MR. CAMERON: Okay. That goes back to our criteria discussion. I think we have looked at a

cross-cutting issue, which is testing. We got a number of comments out on that.

I guess what I'd like to ask is to try to get us back towards at least in the topical area. Are there other important points in collision, the collision section, that anybody wants to bring up at this point? Is this collision, Tom?

MR. DOERING: It can be. It's collision.

MR. CAMERON: Okay. So we're in section two, which is collision. Right? Go ahead, Tom.

MR. DOERING: The collision area, I guess, coming back, again, from the technical side, over the last -- since the regulations have been sort of put together, it's always been the now famous 30 feet on an unyielding surface and going back to basic physics and all the activities, mass times velocity equals momentum. Really, that's -- the momentum really makes a big difference on these activities and how hard the surfaces are.

So from a technical point of view, going 80 miles an hour, going 30 miles an hour is important, but having also what is the surface it's going to run into. So I would make the argument that the testing program in place right now does test the casks to very severe condition already. So I'm trying to understand what would this additional 80 miles an hour or collision activities really

provide us in the technical area, what would it provide us more understanding on.

Understanding also that these calculations aren't done in a vacuum. They are done per ASME Section 3, and that's a very tight requirement. Now, there is a new Division 3, Section 3 written for transportation. That takes a lot of the requirement from the most restricted area of ASME and put them in place.

So ASME is actually used across -- in the whole world. It's no longer just in the United States. So it's a matter of all these activities are well founded in industry and well founded material science areas.

So my understanding is trying to get back to what is really needed, what are we lacking, and I guess I still haven't seen what we are really lacking, what are the holes we're trying to plug. Besides, this really makes me feel good.

MR. CAMERON: Let me go to Ken in terms of the point that was just raised about surface area is important, not just speed. How did the Sandia -- how does your report address that?

MR. SORENSON: Well, for the issues study, what we're looking at for the test recommendation is full-scale rail cask, and, Judy, to mention your concern about test to destruction, what the intent would be is to test it at an

extra regulatory event, a high speed, higher than the regulations, and see if, during that test, we do get the leak path that we predict from our analyses.

So then we can verify the analyses to the test.

MR. CAMERON: Let's make sure we use the microphone, too. But this is in answer to Tom's question about why speed is important here. Is that correct?

MR. SORENSON: I was trying to answer Judy more. Tom is exactly right. Speed is not only important, but also the targeted impacts, and that's why we went through such a detailed analysis of the waste site surfaces in 6672, so that we could properly determine cask response at these very high speeds, as a function of the waste site surface hardnesses.

So it is a combination effect. Thirty miles an hour, again, may not seem fast, from a regulatory standpoint, but when that goes onto an unyielding surface, it's a very dramatic impact for the cask.

MR. CAMERON: Okay. Comments on the surface, not just speed issue, or other collision issues. Is there a comment on the point that Tom raised and the Sandia remark? Bob?

MR. HALSTEAD: Not to belabor it, but getting down to some of the issues that got B ratings and, again, we'll provide some writing on this, we believe the collisions with

non-planer objects is important. We believe the speed issue and the characteristics of collision accidents, but we -- see, we would probably consolidate that, fire, collision, and a review of historical accidents, the way that Bob proposed it, and certainly looking at the sensitivity issues that Bill suggested.

But two points that -- three points that we think are relatively new to the discussion are the midpoint rap accident, the crush environment issue, and the effects of human error.

Again, we've talked about a number of ways to approach those. One that I don't know has gotten enough attention is simply to go through the NRC compliance letter files and look at some of the frequency in which human error issues have been raised, and inspectors' reports.

Fortunately, most of those tests have pretty low price tags attached to them and, at a minimum, could be opened with literature searches.

MR. CAMERON: Bill Lee, and then Steve. I don't know if you're out to us on collision or whether we're still catching up. I mean, who knows what he'll say when we get around to him.

MR. LEE: The point I want to make about collision, if we test to failure or we -- you define a leakage path, the analysis that we do for licensing take in

so many conservatisms that you actually will, like a rap on the side, we don't assume that the neutron shield tank is on it.

But it's there. In reality, it's there. There are -- if you're looking at lid bolts in the seal area, you calculate -- you do a calculation based upon a yield value of the bolts, but the bolt -- the value is taken from ASME and generally it's always above that value.

So you're going to -- and then so you've got to take it to ultimate and generally, I will say, the ASME generally uses the lowest value that it can.

So you've got to take it even beyond that. So what is the actual test you're going to go to if you're going to do to failure, it's going to be very hard to define before you do the test and then once you do the test, if it didn't fail, you can't do it again.

It's a one-shot deal. So just the reality of everything that we have, the actual physical specimens of bolts, of material you use in the cask, all this certified material in the test report I've seen or the actual material of the cask are all beyond higher than what the ASME says to use in the calculation.

So going beyond to failure is very hard to define.

MR. CAMERON: Any comments from Sandia or NRC, anybody else on that? Going beyond failure is hard to

define.

MR. HALSTEAD: I would just agree and I think there is some value in doing testing to failure, but it has to be really well thought out, because as Bill says, if you do it and you do it wrong, you've blown a lot of money, so you better make sure you know exactly what you want and probably John's point of, at a minimum, doing scale modeling before you decide to proceed with that is probably a good idea.

You might not need to do it full-scale.

MR. SORENSON: Full-scale component, Susan says.

MR. HALSTEAD: In this case, you're talking about a full -- I think you're talking about a full-scale cask, aren't you, though?

MR. LEE: A full-scale component would also have the same issues related. The material properties are always -- actual material properties are actually always a higher value than the stated code values.

And just as you test a bolt to failure, every one that I've seen tested is well above the minimum specified. So you -- and that goes into not just the item you're testing, but the fixture that you have if you're doing a component test. The fixture that you have has to be over-designed because of the actual material that you're going to get.

MR. CAMERON: Okay. Let's hear what Ken's comment is.

MR. SORENSON: Just a quick comment. I think Bill is exactly right, and Bob, as well. It's very difficult to do these types of analyses to failure because of the factors of safety involved with the materials, as well as not -- some of the unknowns involved.

The first step in this test that's recommended is a test plan, so that we could actually address some of these issues and to evaluate before we actually do the test.

MR. CAMERON: Okay. So you need a test plan here. All right. Steve?

MR. KRAFT: That sort of covers what I was going to say. Our comments in our letter to Susan from April, we recommend that if you're going to do full-scale testing, that test plans fully articulate what you're going to accomplish, how you're going to accomplish it, what it means, really insurance against the fact that the results don't get misused.

I guess I didn't pick up, in my reading of this, that you were planning on testing to failure. If you're going to do -- I mean, leak path. If you're going to do that, then when it comes down to reporting, I think there needs to be a certain amount of -- what's the word you all used -- perspective and context, where, okay, you tested the

thing, so it failed, you put it in the fully engulfing fire, you cranked it up beyond so much temperature, you ran it for so many hours and, lo and behold, you finally melted the damn seal.

I mean, sure, you could do it. But what does that mean? And that's where Bob's point about up -- I guess Bob recommended you basically update the old modal study historical database, that's fine, but then I think what you have to do is to protect the -- validity is not the right word -- the integrity of the results is to say but we have found absolutely no accident that ever got that transportation or if we did, it was in these couple or few cases, those sorts of perspective statements, because otherwise you're just going to lead people to believe that these things fail in normal transport and you work against Susan's goal of having the public understand the quality of the NRC regulatory effort.

MR. CAMERON: Let's take two more collision comments, and then I want Susan -- Susan wants to do a summary here and then I want to hear from Sandia and the rest of you on thermal.

Kevin?

MR. BLACKWELL: One real quick one. There's been a lot of talk today and in other meetings about basing everything on reality. And when it comes to the package

testing, I don't see why you should deviate from that mindset on package testing.

What are you going to, in reality, experience in the transportation operating environment, and I think that needs to be maintained. I mean, you can't jump from, on one issue, say, well, we're going to -- it has to be based on what's really out there and then on another one, sit there and say, well, let's go to the nth degree. You're bouncing back and forth.

MR. CAMERON: That comment goes to do you need to test to failure.

MR. BLACKWELL: Do you need to test to failure, I mean, let's keep it real and what you're going to experience in the transportation operating environment.

MR. CAMERON: Then, John, final comment on this.

MR. HADDER: I was just going to say that the advantage I can see -- this whole business about testing to failure certainly is a difficult one. One advantage that you could have with it is if you can connect it to what would be a real world accident, then you can extrapolate what is the limited durability of the cask in terms of the real situation, and, in fact, it could turn out, as a result of this, that you could demonstrate even greater public confidence by showing and demonstrating that there are no accidents today so far that would fall under the category.

So I could see where there could be some benefits to doing that, but I think all the precautions that have been suggested already about that are well heeded.

MR. CAMERON: Great. Susan, do you want to summarize?

MS. SHANKMAN: Yes. I just want to see if I've captured the discussion, which is that -- I think I've heard from almost everybody that the testing needs to be public before we spend any money on actual testing; that we need to justify, based on sensitivity study, whether we start with components or work our way up based on the results of the component testing, to see if we need to test more combinations of things and maybe get to full-scale testing if it's needed, but that we start with component testing and use that as a basis for predicting our analysis, do our codes or do our computer modeling predict actual behavior.

And then what I think -- there were several comments that seemed to define worst case as based on known accident data and that the worst case would be the worst known accident rather than, I think Judy said, things that can't happen, postulating possible, physically possible, like the meteor hitting you in this room is maybe physically possible, but we don't know of a place in Las Vegas where a meteor has hit somebody in a room. So that wouldn't be the worst case based on existing data.

So if I heard it correctly, it was worst case, in this case, is based on worst accident data, and that's why it's -- John, I guess, would consider it realistic in that it's something that has happened and maybe your truck, your Caterpillar truck was destroyed, and so we'd be working from that base, rather than worst case being what someone could think of as the worst possible combinations of things, Steve's mother-in-law notwithstanding, coming together in an array of physical properties that hasn't happened yet and might not happen, would be very improbable.

Am I understanding this discussion about testing?

MR. HALSTEAD: I would just like to add to that that I think you've identified a couple of -- the next step, it seems to me, on this, is for Sandia to scope out the pros and cons of testing to failure versus testing to the worst condition that we can document in a historical accident, versus simply doing the regulatory test.

I mean, we almost need to do a sensitivity analysis on the cost and feasibility issues associated with going to each threshold and testing.

I've just gone through a project with a really good thermal engineer at UNR about fire testing and looking at the program to benchmark the CAF code and then looking at costs. I'm telling you, I knew it was going to be complicated, but I found out it was a lot more complicated

than I thought and I was somewhat humbled by the experience.

So I'm saying, but do this scoping, Susan, as the things we need to determine and not say that we know the answer yet. I think that's what you're saying, because we don't know the answer.

MS. SHANKMAN: Right. I understand. And I think that what I come out with is that the testing plan, with justifications for what we are actually going to do, even if it's step-wise, start with this, results of that lead us to this or that, should be for public review before we move forward.

MR. HALSTEAD: So the issue is hold off a commitment to full-scale cask testing until further examination. That really ought to be your bottom line at this point.

MS. SHANKMAN: And what I'm hearing is that collectively you would like to see that put out for public review. Okay. So I'm understanding that. I guess the other thread that I picked up is human factor issues, Bob, and since that's what my doctorate is in, human factors issues, we can talk about how complicated that is, because if you think material properties are hard to predict, human behavior is much harder to predict.

So that it may be that those need to be studied separate and apart rather than pulled together into one

analysis. But we can talk about that.

MR. CAMERON: Okay. In fairness to everybody, I think I need to ask. We were going to break up at 4:30 and do some individual sessions around the room. Obviously, there's a lot of other subjects to cover here and I guess my question to all of you is we've been at this since about 1:30. So that's about three hours now. Our skirts are falling off the table, so I think everybody is getting tired.

But do you want to set a time for when we should break today and just say that we've accomplished as much as we can and if we do that, do you want to take, depending on when it is, do you want to take a short break so that you can get away from this table or do you just want to run through till five? Susan, what's your NRC pleasure?

MS. SHANKMAN: Remember that September 13th is another day and that we will appreciate written comments, which you may have the chance to think through, and we'll be glad to have a dialogue through the internet web site.

So we don't have to get everything in today. It's my plea for picking a time to end.

MR. HALSTEAD: Could I suggest a process? Could we go around the table and let everybody -- or take the break first, but I think it would be useful to let everybody identify one of the issues that Ken has scoped in here.

MR. CAMERON: This is going to be a public meeting. There's going to be a presentation on that. Before we close on this, Jackie, did you have something you wanted to say here? And please identify yourself.

MS. GOFF: Jackie Goff, Department of Transportation. Again, it's just a request that after listening to two hours after lunch and lots of platitudes about why this report was good, I still don't know, because I haven't read the report, wasn't given the advantage of it, other than the ranking, why any of the rest of you think it's such a great report that Sandia did.

Could someone, for the benefit of those of us who are out here who remain ignorant, at least tell us in five minutes or less why you think it was a good report? Was it the analyses, was it the thoroughness, the time period it covered? I don't know.

MR. CAMERON: I think Bob did have some reference to that, but let's hold on that and we'll either address it when we come back or else we'll address it some other way. But what if we took -- if we stayed here till 5:15, would anybody have any objection to that, and do Bob's parade of biggest issues, which I think is probably a good idea?

Take a short break now. Most people -- is that acceptable? Okay. Let's take a break and come back at 25 to and then we'll go to 5:15.

[Recess.]

MR. CAMERON: All right. We're going to try to make our final push here and see if we can get some major issues out on the table in the last half-hour or so.

We did have a request from a member of the audience to put a little bit more gloss on the issue of why people thought that the Sandia report was such a good report.

So I'm going to take the opportunity to briefly allow people to try to articulate, if they want to, why they thought the Sandia report was a good report, and I'm going to start with Bob, who already said something about that.

So, Bob, the issue, you heard the question from the audience. Do you have anything more to add to that than what you already said?

MR. HALSTEAD: Yes. I think the report was significant in two respects. One, in terms of laying out an intelligible matrix of what the key issues that need to be evaluated in reconsidering the modal study, which means what's the appropriate matrix of issues for cask performance in severe accidents was done very well.

It paid appropriate attention both to hardware issues; that is, the performance of the cask, the response of the fuel assemblies, rods and pellets inside the cask. So it dealt, I thought, very comprehensively with the

physical issues.

It also dealt, I thought, although maybe not as well, but in an adequate manner, with issues that have not been sufficiently addressed in the past, like the role of human error, issues like emergency response team response times.

So from the standpoint of identifying the issues in an intelligible manner, the report was outstanding. I thought, secondly, the report was outstanding in that it concisely and fairly, from my reading, captured the most important issues that the different stakeholders raised and the people who were in those meetings will remember that there were some very contentious times.

A lot of people, frankly, aren't always comfortable being around a table in the same room with one another, and I thought that the combination of the NRC staff, the technical staff who were taking notes, the moderator, and even -- I am told there was some input by people like Susan, who aren't normally involved at that level of this type of activity, plus the Sandia staff, who had to review the transcript and all the materials produced by the meeting.

So on two scores. One, on capturing the important technical issues and, secondly, on fairly representing the views of a very differentiated group of stakeholders, the

report was exceptional.

And I can't remember another document from an adversarial proceeding that I thought was as good on either the technical or the representational issues.

So I took about four minutes, I guess.

MR. CAMERON: I think that was pretty thorough. If anybody else wants to offer anything in addition to that, please offer it now. If you think Bob has adequately summed it up, we'll just leave it go at that. I'm recognizing that other people might have a different opinion, also.

Okay. I think Bob had a good idea, also, in terms of, in the time remaining, if we could go around and get from everyone what the most significant issue or concern they have with the Sandia issues report at this point, and we'll list all those and at least we'll have sort of a representative sample of significant issues.

And, Bob, since it was your suggestion and a good suggestion, I guess I would turn to you first and then we'll move down to -- down this way.

MR. HALSTEAD: My top priority remaining issue is actually a combination of two. It's spent fuel, rod and pellet performance under severe accident conditions, and, in particular, in my own mind, I'm struggling, if I had to allocate money and I could only conduct experimental work to assess the effect of high speed collision forces on the

cask, affecting the spent fuel, or the thermal impact of an extra regulatory fire, I mean, that's one of the issues we're struggling with now.

Hopefully, we'll address both, but if I had to pick one, I'd be hard pressed to make the decision now. But the generic issue, fuel rod and pellet performance under severe accident conditions, my number one remaining issue.

MR. CAMERON: And the report itself does address that and as Ken pointed out, it rates it an A issue in terms of testing. Is that correct? All right. Tom, we're going around, as Bob suggested, to give everybody's top priority for what should be addressed in the Sandia report. Bob brought up a generic issue that's covered in the report. You can either bring up a generic issue or if there is one thing in the report that you really disagree with in any way, offer that up, also.

MR. DOERING: I guess the area that I'd like to offer up is what we mentioned before is the correlation between the things that we're looking at right now and the regulatory issues that we're trying to resolve or if there was a regulatory requirement that we haven't put together yet and the NRC has enforced.

I'm trying to get the connection between what we wish to do for administrative purposes and what we need to do technically.

MR. CAMERON: So in other words, maybe --

MR. DOERING: From a scientific point of view, from an engineering and scientific point of view, what don't we know that we need to understand and then put together a test plan to understand that.

MR. CAMERON: Let me ask you, if I understand this correctly, do you think there needs to be more specificity in the report as to why a particular item was recommended?

MR. DOERING: Yes.

MR. CAMERON: Okay. Because if it was recommended for we just need to know more about this versus to prove a regulatory requirement versus public confidence, then that might be useful information in deciding what should be done. Is that right?

MR. DOERING: We're not saying whether it would be done or not. That's not the calling to say whether it will be done or not, but to give some insight for the regulator and also for the applicant to understand what is required to show that the design is sufficient and what is needed for the design to be shown to be gaining public confidence.

Let's say one is less important than the other, but we then understand which one that we need to work on, an engineering point of view or do we need to go to the ultimate failure, dropping it from a very high distance to show it still bounces.

MR. CAMERON: And that covers a lot of ground. Rob, do you want to comment or ask a question?

MR. LEWIS: I would just like to respond to that a little bit. This is a point that keeps coming up today. And originally, it was in my talk, but it got pared down. One, the starting point for the package performance study will be a cask that meets the NRC regulatory test, hypothetical accident tests.

We're not questioning those tests with this study. The risk studies that we do, including NUREG-0170 and NUREG-6672, acknowledge that there are unlikely, extremely unlikely accidents which could exceed -- the forces in those accidents could exceed the forces represented by the Part 71 test.

And for those conditions, you could have a release of material. The package performance study is designed to look at that extra regulatory space and show that the risk studies we have done, which are behind our regulations, but aren't in our regulations, are adequate.

So I just want to reinforce the point, we are not trying to change the regulations that we have in place. We have had very favorable experiences using them and we see no reason to challenge them.

MR. CAMERON: And, Rob, let me ask you a question. Was the NRC and Sandia thought that if we did confirm those

risk studies, that that would result in more public confidence? In other words, public confidence was sort of an outcome of this, because I think we had a lot of discussion around criteria.

MR. LEWIS: I think, yes, of course, that's true, but we haven't tried to quantify any measure of public confidence.

MR. CAMERON: All right. Good. Good suggestion. How about you, Bill? Again, the generic issue of what you think is most important or one thing in the report that you didn't disagree with or something positive, whatever.

MR. OTT: Okay. I don't really have any particular problem with the report. I thought it was fairly well done. I'm kind of like Mike, and I'm not sure to the extent that we have a public confidence problem in this particular area. I think it may be more of the bliss of ignorance.

Kind of as a backdrop, all I really have to say is to kind of reinforce some of the stuff that was said before. If we're going to do testing, I think it should include both collision, fire, and it should be basically scaled to some -- I think Susan probably said it the best, to some maximum credible scenario, not some idealized scenario that we've experienced kind of in the real world.

We certainly shouldn't be testing these things to

destruction, because I'm not sure what we'd learn from that. Basically, that's about all.

MR. CAMERON: Okay. Testing to include both fire and collision, but the most salient point is it should be tied to the real world and not to some sort of idealized failure condition. All right.

Let's go to Mike.

MR. BAUGHMAN: Well, I've expressed a lot of opinions so far, so I don't know. I guess what I would encourage is maybe just two things.

One, all of the As, perhaps the Bs in this chart suggest to me uncertainty. We are uncertain about perhaps the results or uncertain about some of these assumptions as they might affect risk assessment.

I think that the report needs to be very clear that you are uncertain about these areas and that it does perhaps affect the risk assessment, and the risk assessment that you're about ready to publish probably needs to say that, as well, that there are areas of serious uncertainty.

Then there is the justification for doing some of this, which I obviously question the justification. I think there's a lot of other areas to spend our money. And just for the sake of our DOT person out there, all the risk analysis I've ever seen suggests that most of the deaths that will result, the fatalities that will result

from management of radioactive waste will occur, one, not in repository operations, but with transportation. And within transportation, most of the fatalities don't result from exposure to radioactivity. It's just normal accidents.

So if we really want to protect public health and safety, let's spend our resources reducing accident risk and not worry as much about exposure to things radioactive, but just saving lives from normal wrecks, because that's where most of the fatalities will occur over the life of this project.

MS. SHANKMAN: You're looking at routing considerations and --

MR. BAUGHMAN: It could be routing and modal choices, truck safety, whatever. The only other note I would have is on page three in your definitions, I do see where we have -- you have this resolves a very important technical -- or confirms the adequacy of a very important -- to me, the first part of that is the technical basis, technical question, the second half is actually public confidence, confirms the adequacy of very important analysis.

That is a public confidence thing. It may be helpful, as you go forward, to think yourselves, well, did we give -- purchase the full-scale rail cask as an A, is that because it resolves an important technical shortcoming

or is it because it confirms the adequacy of the very important -- that would tell us whether it's a public confidence thing or a technical, perhaps risk assessment regulatory issue.

Thanks.

MR. CAMERON: I think that, Tom, that's the point that you were making, also. So it looks like that's going to be very important for us to do.

Let's go to Steve Kraft.

MR. KRAFT: I have nothing to add.

MR. CAMERON: All right. Thanks, Steve. I guess I could skip all you guys. All right. John?

MR. HADDER: A couple things. I thought Mike was going to touch on it, but I'm not sure he did exactly. He talked about the uncertainty, that's one comment I would have is that the ratings for uncertainty analysis were rated very low, for the most part, in this and I actually -- that really concerns me, because in a lot of this, when we're doing risk assessment, I'd really like to see a better sense of how the errors propagate in all this modeling process and that sort of thing, and I think that's important in terms of what you can really do with the numbers and how far we can go with them.

So I think I really would recommend that that be reexamined and the importance of that.

The other thing was I was a little confused about the -- it does state in here, on page 14, that it should not be the goal of the study to validate the use of scale model tests for certification of cask designs.

However, one of the viewgraphs earlier did say something about validating scale model, using scale models, which is allowed in the regulations.

So I guess my comment is when possible to affirm that the regulations are doing what they are supposed to do, I would recommend -- maybe that's not the goal of the study, but to, when possible, use the data, use the information and results to validate that scale model -- that you understand what science you're working on and that when possible, connect that to the regulation.

It's just another step that probably can be done without a lot of extra effort, when possible.

I think that's really the -- oh, the only other final comment I have to add is that I really don't think that this technical criteria and this public confidence are entirely mutually exclusive. I understand the points that have been made and they're valid points, but in my feeling, I think that -- and I wouldn't say that they're necessarily mutually exclusive. If you address technical issues and if organizations, like my organization, Citizen Alert, and others understand what's going on with that, we can

communicate that to the public and that will impact the confidence. So I think it's important to state that, just for the record.

Thank you.

MR. CAMERON: Good. Thanks, John. I think your last point is something that has been brought up by both Tom and Mike, and goes to a comment that Rob Lewis said that public confidence is the outcome of technical merit, confirming the risk studies that we were talking about.

We're going to skip Bob and we're going to go to Bill Lee.

MR. LEE: I'm going to repeat Bob Halstead's on spent fuel rod assembly performance. But I'm going to be a little more specific on that we need to get it on high burn-up fuel, because that is what is the -- the utility is going to be driving their fuel to and it's not the low burn-up, old cold stuff. It's going to be the actual higher burn-up stuff that is going to really be driving the whole system, the contents, actually.

MR. CAMERON: Go ahead. Use the mic, so that Carey gets it.

MR. KRAFT: In the early shipping campaigns, whether you're talking Yucca Mountain, PFS or some undefined location in some of the 63 states, we once counted, there were 63 of them, and the early shipments will be the lower

burn-up, but the point Bill is making, we haven't covered, in our work at NEI, with Susan's counterparts, on spent fuel storage, we were trying to work on the question of higher burn-up for the storage canisters, because that's what utilities need to buy now.

And it will be fairly short period before you move over to -- and I'm glad you brought that up. It hadn't crossed my mind to bring it up here.

MR. LEE: And that is one of the areas, as a cask designer, we are not a fuel fabricator and that type of information is drastically needed from the fuel fabricators to help reinforce all of that.

MR. KRAFT: Unrelated to transport, we are collecting the fuel burn-up data. So we'll provide that, if you need it. You might as well do it that way, because you'll just have to do it again. That's a good point.

MR. HALSTEAD: I'd just like to add, that's a concern of ours, also, but for these reasons, and, in addition, because of the continuing uncertainty about the thermal laoding appraoch to the repository, you can't always say, all other things being equal, that the high burn-up fuel is hotter, but for the most part, it is and there may actually be some incentive for DOE to seek early truck cask shipments of high burn-up fuel for early work in waste package performance testing in the early phase, whereas

normally you would expect that fuel to come later in the queue.

So there's some uncertainty and we need to be prepared for it.

MR. KRAFT: Unrelated to this discussion, maybe we should talk about that, because that is an issue that we're trying to understand better, because what the source term from the utility to the repository is is one not terribly well known yet by DOE, but it affects us, too, how we then present it.

So if you've got some views on that, I think maybe we ought to talk.

MR. CAMERON: Good. Thank you. Bill Lake.

MR. LAKE: Thank you. I'm simply going to repeat my last comment, but possibly in a different way. I think the list captures all of the concerns that have been expressed in previous meetings and I think Sandia has probably added some of their own thoughts, as well as NRC's.

But the next step, before you go into the next step, I think, is to take this qualitative ranking and quantify it and that can be done with the sensitivity analysis.

Thank you.

MR. CAMERON: So this is a sensitivity analysis point that you brought up. Okay. Great. Thanks, Bill.

Rick?

MR. BOYLE: Thank you, Chip. I've got to start out saying I'm a pretty big cynic, so I've tried to keep quiet today and just listen to everybody's ideas, and here goes.

The first problem -- I think the Sandia report did a good job based on the constraints that they were put under. I really have some questions about a lot of the issues that are appearing on the charts, but also the ratings, putting something as an A that you're resolving a big technical issue.

I don't think the NRC has an absence of knowledge in most of these reports and I base that on a lot of work with the NRC. If they really had a safety concern or they felt there was a technical shortcoming that had to be resolved, they would really get on the ball and they would resolve it. They would not wait -- I'm going to guess this would take five or ten years to finish, buy a cask, do a test program, finish it out, prove there's a shortcoming, start an answer.

If the NRC had a sense that there was a real technical shortcoming, I believe, for safety consideration, and it would be their job, they would act on it independently and be a lot faster.

So I have a question as to how real and how much

knowledge or lack of knowledge the NRC has about this.

A bit of a comment that was made earlier about how the last meetings went. I feel this is a little bit of a wish list, that we went out and we said what would you like us to do or what would convince you, and we consolidated this list, and that brings me to the next comment for Sandia, the range.

It bothers me quite a bit that at their first cut, this is a very, very expensive program, and, again, being the government cynic that I am, if the first budget cut is ten or 20 million dollars, just imagine what it's actually going to cost when you do it. So I think it's a very expensive list.

Another comment that had been made today is I think even if you finish the whole program, it's not going to convince anybody either way. The people that are opposed to this project now will be opposed to this project when you finish this report. The people that are in favor of this program will be in favor of this program later on, plus or minus one, two percent, a small percent may be convinced.

And the mid range will probably stay the same. They may shift their opinion, but they will still be there.

So there's a little bit of what did you achieve with this.

The extra regulatory nature of this bothers me

considerably because I work in the Office of Hazardous Materials and radioactive materials as a whole is about two or three percent of all hazardous material. Hazardous material is not regulated this way, where you get to set the standards and then say, well, what if we exceed the standards two, three, four magnitudes.

It's just not done. There is no precedent to do it this way and I'm not sure why we've done it this way. I question -- well, we have to redo the risk summary, if all the tests are passed and the pro nuc people are very happy, will we then go back and redo the risk and say remember when we barely had anything showing up on that chart, now it's even lower.

I don't know what we're going to do with this. Again, because I work with radioactive material, spent fuel, even 5,000 shipments a year in a large campaign would be nothing compared to three or four million shipments of radioactive material a year.

So I think the spin-off effect of these issues you are raising could cause industry, the radioactive material, the pharmaceutical, everybody else, their industry, a lot more problems, so maybe they should have a seat at the table, because you're going to impact type B testing and once you do that, you've got a much larger audience than is around this table.

And then two comments, I think, that were just made around here, so I'll be brief. If you look at the Sandia, one of their early presentations from this morning, you may think that they underestimate risk, but let's say they underestimate it equally.

The accident risk was really small bars to the point they were just lines, but when you looked at the non-accident risk, it was much higher. That's what points out you're going to get your dose, you're going to have your problems, not in 80 mile an hour accidents, but in more the routine, just how you transport it, how many people do the inspections, how are these things loaded up.

It's more the routine and we've spent little or no time talking about just routine transport today compared to what we've talked about with accident.

Then, finally, it was a very good point that was brought up. It's going to be accidents that have nothing to do with radioactive material is where people are going to get hurt and die. It's going to happen. Truck drivers, rail, they have accidents and just the accident scenario, regardless of what you're carrying, is going to be the problem, and, again, I don't think we've addressed that very well in the Sandia report.

Thank you.

MR. CAMERON: Okay. Thank you, Rick. Let's go to

Bob Alcock and then we'll come over to Kevin and then I think want to see if there's any questions in the audience, then we'll close up.

MR. ALCOCK: Chip, if I might take a moment here to tell a little story. I had the occasion to go to a meeting and try and brief a mayor of a certain small town of northern California about a shipment that was coming of spent fuel and I was all prepped up and I had a facsimile spent fuel rod with me and a slice of a type B cask and I had a presentation all ready to go, and ready to anticipate his questions and everything.

And he said, "Look, before you get going, my daughter is in the Nuclear Navy and I called her up and she said, 'Dad, don't worry about this stuff.'" And he said let's go have a beer.

So you never know what kind of information people bring to the discussion that you're in. Sometimes you'd be surprised at this.

But I want to thank you, Chip, for the way you've handled the meeting today and kept us to be civil with one another and I want to thank NRC for having the meeting, and I just want to say that Sandia has put together an excellent report and one which I, a non-technical person, can mostly understand.

Thank you very much.

MR. CAMERON: Thank you. Thank you, Bob. Kevin?
MR. BLACKWELL: I'll make mine short and sweet. First off, FRA wants to go on record as saying that anybody who is going to ship this fuel, wants to pursue highway shipments, we're 100 percent for that. And I need to go on record to say I'm not speaking for the railroads here, as has been mistaken in some other meetings, where they haven't been attended, but FRA has been here and it's been construed that they -- we may be speaking for the rail carriers. That is not the case.
So anything I've said today has been from the aspect of my position with the agency, with the Federal Railroad Administration.
I really didn't have too many problems with the report, from what I could read. I'm not a technical person, I'm not a mechanical engineer or any other kind of engineer.
Obviously, everything in the report has some kind of merit, from what I could tell. You seem to have hit on -- Sandia seemed to hit on the major issues that, in my dealings in this arena for the past eight to ten years, have been expressed by many of the rail carriers, as well as folks representing the general public, in that how is it going to react in a rail accident and thermal fires situations, that kind of thing.
So at first blush, obviously, this was a

three-year project, it's going to be revised, it's going to be refined. Asking me if I had any real issues with anything, other than what I've said earlier today and during the course of hitting the particular topics, nothing that I can think of here that I wouldn't be just restating.
Obviously, FRA is more than happy and we plan on working with NRC on this to provide any kind of information we can, accident data, whatever we can to help bring this to a final where it will help you do what you want to do with it.
MR. CAMERON: Thank you, Kevin, and thank you for being here, as well as the rest of you. Audience, you've heard a lot of discussion today and some meandering back and forth, but are there any comments or questions out here from the audience before we close up?
[No response.]
MR. CAMERON: Okay. Well, I'd just like to thank all of you for being here and for the good comments and for paying attention and I hope it was educational for you and I hope that it will help you to prepare your written comments.
I'm going to ask Susan, as your senior NRC official here -- and I should thank all the Sandia folks for all the support, too, but I'll let Susan close it out for us.
MS. SHANKMAN: I'd just like to say thank you all

for being here, for being candid and for respecting each other's opinions. And, please, send in written comments, use the interactive web site, if that's easier, and I guess we'll see some of you on September 13th. So thank you all for being here.

[Whereupon, the meeting was concluded.]